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ALTERNATIVE CONCEPTS FOR ORGANIZING THE TOTAL FORCE

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This study describes organizational and personnel policy options that would increase the number and combat effectiveness of fully trained and readily mobilizable units that the U.S. could produce for any level of spending on Operations & Maintenance and Military Personnel. Some of these policies would help the Services produce more cohesive units. Others would organize retirees, members of the Individual Ready Reserve, and active-duty personnel who are not assigned to operational units so that, in the event of an emergency, they could re-form the operational units in which they had served together. Still other policies would permit emergency recall of former-service personnel who would not be available unless current practices were changed. Last, the study describes ways of using members of the Selected Reserve to strengthen units formed via the policies just described.

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PREFACE

The Institute for Defense Analyses has prepared this paper under Contract No. MDA 903 89C 0003, Task Order T-L6-793, Total Force Policy Study, for the Executive Director of the Total Force Policy Study Group, OASD (FM&P).

The Congress has directed that the Secretary of Defense conduct a review of Total Force Policy issues. IDA has conducted this study in support of that review.

This study describes two sets of alternatives to current total force policies. One set would allow the DoD to maintain forces that would be as large as possible across a wide range of funding levels. This set would allow DoD to field forces that could embody proficiency and readiness levels appropriate to a wide range of warning times. The second set identifies desirable ways to use the full range of manpower assets available to DoD in peace and war.

The authors thank the IDA review panel, which provided helpful guidance at several stages in the study, and reviewed an earlier draft of this report. The panel was chaired by Dr. William Schultis and included W. Y. Smith, General, USAF (Ret.), President of IDA, Mr. Martin Binkin, Ernest C. Cheatham, Lt. Gen., USMC(Ret.), Andrew Goodpaster, General, USA(Ret.), Richard Goetze, Major General, USAF (Ret.), Harry Train, Admiral, USN(Ret.), and Mr. Jerry Turley.

We also thank our editor, Miss Shelley Smith; our research assistant, Mr. Robert Begland, our publications coordinator, Ms. Barbara Fealy; and Miss Erika Tildon, Ms. Cori Bradford, Ms. Teresa Dillard, Miss Angela Toney, Mrs. Jackie Evans, and Mrs. Eva Wiggins, who typed several drafts and prepared the final manuscript.

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GLOSSARY

KEY TERMS

Call-Up Units

Inactive units to which former service personnel not in Standby units could be assigned in peacetime and which new recruits or draftees would join in the event of a mobilization

Cadre Crew

Experienced career sailors and NCOs assigned to a ship for extended tours; set at about 30% of the complement of the ship's normal crew

Cadre Personnel

Inactive personnel whose units are no longer in Standby status and who are assigned to provide the leadership structure for Call-Up units in the event of an emergency

Cohesive Unit Policies

Measures that would help the Services build long-service cohesive units

Current System

Manpower practices that are, broadly, characteristic of the Services today; these practices include: a tendency to treat personnel as interchangeable parts defined by objective data rather than as individuals with personal ties to others with whom they have trained and served; a tendency to rely on replacement and rotation of individuals rather than units; a tendency not to link former service members with units in which they had served just prior to leaving active duty

Cruise Crew

A group of sailors that go through refresher training together and bring the ship's crew up to full strength for a year in Ready status

Double-Hatted Active Duty

A category of personnel that are on active duty in the non-operational part of their Service, and that are also assigned to units in Standby status

Extended Leave

A proposed category of active service; individuals would enter Extended Leave for one year after leaving full-time active service, and would receive some form of compensation while in that status

Inactive Service Reform

Proposals to change current practices concerning the service obligations of former service personnel; incorporates Extended Leave and a mandatory inactive service extension

Individual Ready Reserve

A group of former Service personnel whose military service obligation has not yet expired; under current law, members of the IRR can be recalled to active duty for two weeks each year

Mandatory inactive service extension

A proposal to require Service personnel to obligate themselves to return to active duty if called anytime in the first four years after they finish active service

Mobilization crew

A group of fully trained sailors that, in an emergency, would augment the crew of a ship in Standby status; it would be comprised of EL/IRR sailors, recent retirees, and double-hatted active duty sailors whose jobs in the support establishment would be filled by retirees or Selected Reservists recalled to duty

Ready-Standby Organization

A method of organizing personnel into a mix of Ready, Standby, and Call-Up units

Ready Units

Units that would be fully manned by full-time active duty personnel in peacetime

Standby Units

Units to which fully trained personnel would be assigned and to which those personnel would be recalled in an emergency

Total Army

The active Army, Army Reserve, and Army National Guard

Total Force

An umbrella term used to denote all of DoD's manpower resources, including active, reserve, Guard, retired, and IRR personnel

Unit Cohesion Model

A set of organizational and personnel policies that, with appropriate modification for each Service, would increase the number and combat effectiveness of fully trained and readily mobilizable units that the U.S. could produce for any level of O&M and MilPers spending

Unit Personnel Tracking Model

A simulation model developed to compare the impact of (a) Cohesive Unit Policies, Ready-Standby Organization, and Inactive Service Reform and (b) manpower practices currently characteristic of the Services

ABBREVIATIONS

AFR	Air Force Reserve
ANG	Air National Guard
AR	Army Reserve
ARN	Army National Guard
EL	Extended Leave
IRR	Individual Ready Reserve
MEU/SOC	Marine Expeditionary Unit/Special Operations Capable
MSO	Military Service Obligation

O&M	Operations and Maintenance
RAG	Readiness Air Group
RSO	Ready-Standby Organization
TFTW	Tactical Fighter Training Wing
UCM	Unit Cohesion Model
UPTM	Unit Personnel Tracking Model

EXECUTIVE SUMMARY

The DoD can preserve the number of fully trained units in its current force despite budget cuts, and can make those units mobilizable within the longer warning times now expected. To do so, the DoD must change current manpower and organizational practices so that it can draw on its 1980s investment in people and in equipment.

Each Service could respond to budget cuts by converting some active-duty units into "Standby" units to which it would assign a mix of Individual Ready Reserve, recently retired, and active-duty personnel who are not assigned to operational units. Over time, it could assign all the members of an active-duty unit to such a Standby unit after a period of active service together. If recalled in an emergency, such units would both complete refresher training more quickly and perform more effectively than would units whose members had not served and trained together before.

To preserve force structure despite smaller numbers of full-time personnel, the Services need enhanced ability to recall former-service personnel to duty. To this end, the Services could change officer and enlisted contracts to: (1) require a four-year inactive-service obligation of everyone leaving active service prior to retirement and (2) create a new form of active duty, "Extended Leave from Active Duty," for the first year after personnel leave full-time service. Personnel on Extended Leave would remain members of the active component of each Service and could be recalled on short notice. They would receive some form of compensation to avoid objections that might otherwise arise if they were recalled to duty before Selected Reservists.

Each Service could produce more cohesive and effective units by adopting the following practices: (1) Assign individuals to units along with others with whom they had served and trained previously, and keep them there for prolonged periods. (2) Change assignment, recruiting, and promotion practices so as to establish a career-long affiliation between particular individuals and their units, akin to the British regimental system. (3) In an emergency, recall Individual Ready Reservists and recent retirees to form units comprised of people that had served together while on active duty. (4) Recall other retirees to other-than-operational jobs, to free active-duty personnel to rejoin the units just described.

Each Service would have to modify the policies just described to fit its mission and patterns of operation, and would have to decide how best to use its Selected Reserves in light of these modifications.

Some changes in Total Force policy apply only to particular Service components. To respond to calls for fewer U.S. personnel in Europe, the Army and Air Force could substitute host-nation reserves and civilians for active-duty support units, transfer the air defense mission to German forces and some helicopter units back to CONUS, and substitute Multiple Launch Rocket Systems for 8-inch artillery. Instead of "heavying up" leg infantry, the Army National Guard could convert these units to motorized infantry. Finally, the Services could rely further on Guard and Reserve units to perform technical missions that resemble civilian activities.

I. INTRODUCTION AND OVERVIEW

The Congress has directed that the Secretary of Defense conduct a review of Total Force Policy issues. IDA has conducted this study in support of that review.

A. KEY ASSUMPTIONS

The analysis presented below reflects two assumptions worth stating here. First, this study assumes that DoD will have to make do with lower Operations and Maintenance (O&M) and Military Personnel (MilPers) budgets over the next several years. These cuts may well be postponed owing to events in the Middle East, but we assume that they will occur in the foreseeable future. This assumption implies that the Services are going to have to reduce the number of full-time personnel on active duty. Second, in keeping with our task order, this study assumes that DoD will want to maintain the largest and most ready forces possible. It describes options that would permit DoD to maximize force structure (i.e., the number of fully equipped and readily mobilizable units) within the limits of available funds.

B. REPORT STRUCTURE

The report describes alternative total force policies that fall into two categories. First, it describes the Unit Cohesion Model (UCM), a set of organizational and personnel policies that, with appropriate modification for each Service, are designed to increase the number and combat effectiveness of fully trained and readily mobilizable units that the U.S. could produce for any level of O&M and MilPers spending. Second, it describes a set of alternative policies that apply to particular components of the Total Force (e.g., the Army National Guard). UCM policies received greater scrutiny in our analysis and constitute the most well developed options described below; the second category of policies warrant consideration but did not receive the same degree of analytic attention in the course of our research. The balance of this chapter provides an overview of UCM policies.

Chapter II provides an overview of how UCM policies could be applied by each of the four Services, and summarizes alternative but non-UCM policies as they pertain to

particular branches of each Service. Chapters III through VI go over the same material in greater detail. Chapter VII discusses topics for further research.

C. THE UNIT COHESION MODEL

The UCM incorporates four different sets of policies: (1) Cohesive Unit Policies; (2) Ready-Standby Organization; (3) Inactive Service Reform; (4) Alternate Patterns of Selected Reserve Service. These four policy sets could be adopted in toto; our analysis suggests that they would prove most beneficial if they were. However, they need not be regarded as a package; a Service or component of a Service might choose to implement one or more sets (or even some but not all of the measures within a set) but not others. Moreover, the Services might initially adopt UCM policies for only certain units. This "testbed" approach would both allow the Services to shift gradually from the current system to a UCM alternative, and let them fine-tune UCM policies based on lessons learned from initial implementation. This summary section reviews each of these sets of policies in turn.

The following discussion of the UCM frequently contrasts UCM policies with the "Current System," the term we use to refer to manpower practices that are, broadly, characteristic of the Services today. These practices include the tendency to regard soldiers, sailors, airmen, and Marines as interchangeable replacement parts defined by objective data (e.g., military operational specialty, rank, and years of service) rather than as individuals with personal ties to the others with whom they have trained and served. They also include the tendency to rely on individual replacement, rather than replacement by units or groups of individuals, in meeting manpower goals. In the Current System, manpower plans tend not to make any attempt to link former service members [e.g., retirees or members of the Individual Ready Reserve (IRR)] with the units in which they had served just prior to leaving active duty.

1. Cohesive Unit Policies

a. Rationale

The policies described below are designed to increase unit cohesion and to keep service personnel together in the same unit for prolonged periods. A variety of evidence suggests that such units (i.e., what we term "long-service cohesive units" or "cohesive

units," for short) would perform better in combat than would units of the type produced by the current system.[1] We believe that Cohesive Unit Policies will improve the combat effectiveness of all units, but they are particularly important in units that take high casualties and where all the members of the unit face the enemy.

First, senior officers who have had experience with both units produced by the current system and long-service cohesive units contend that the latter are considerably more effective. In response to our questions on this point, General Don Starry (Ret) estimated that the latter would be "two to three times more effective;" General Andrew Goodpaster (Ret) did not make a numerical estimate but said that the difference was "like night and day." Lt. General Walter Boomer of the Marines recently wrote that "unit cohesion and personnel stability should be the most important goals of our manpower policy."

Second, Martin van Creveld's careful historical comparison of the Wehrmacht and the World War II U.S. Army concludes that German practices that created long-service and cohesive units--and not any feature of national character or Nazi ideology--are key in explaining the superior combat performance ("fighting power") of German units.[2]

Third, some aspects of the U.S. Army's experience with the COHORT system suggest that prolonged service in the same unit enables military personnel to surpass the levels of unit skill achieved by units in the current system. Former COHORT battalion commanders we interviewed argued that such units are superior to non-COHORT ones. In addition, one widely noted problem of the COHORT system--morale difficulties that arose when non-commissioned officers (NCOs) assigned to such units proved unable to teach their soldiers new skills once those soldiers had mastered the basics--indicates that, when

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1 For further discussion of cohesion and military performance, see Edward Shils and Morris Janowitz, "Cohesion and Disintegration in the Wehrmacht in World War II," *Public Opinion Quarterly*, v. 12, 1948; William D. Henderson, *Cohesion: The Human Element in Combat*, National Defense University Press, Washington, D.C., 1985; and Martin van Creveld, *Fighting Power: German and U.S. Army Performance, 1939-1945*, Greenwood Press, Westport, Connecticut, 1982.

2 Van Creveld cites a wide range of contrasts that help account for the superior performance of German units, and many factors were not related to long-service and unit cohesion. For example: the Germans sent their brightest people to serve in combat units, while the U.S. Army did the opposite; the Germans emphasized individual initiative and gave responsibility to commanders at low levels in the organization, while the U.S. Army was "not nearly as strong in its call for independent action;" the Germans punished military offenses like desertion quite severely, and the U.S. Army did not. Even so, van Creveld's study emphasizes over and over again features of the German system which produced cohesive units filled with men who served together for long periods; we attempt to imitate these features in the design of the UCM.

they are kept together for accretive training, personnel can reach higher skill levels than they typically attain under the current system.

b. Hypotheses on Cohesion and Effectiveness

Figure I-1 depicts our hypotheses concerning unit effectiveness under (a) the individual replacement system (i.e., the "Current System") and (b) a system designed to produce long-service cohesive units.

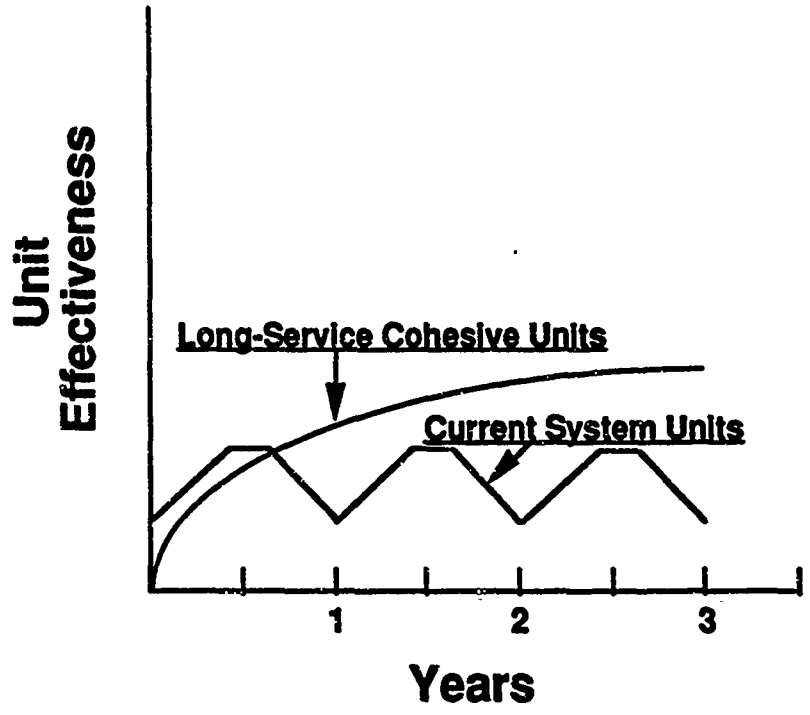

Figure I-1. Hypotheses About Cohesion and Combat Effectiveness

The sawtooth curve reflects our hypothesis that, in the current system, personnel turbulence limits unit effectiveness. Because new and relatively untrained people are continually joining the unit and trained people are continually leaving it, the unit cannot get beyond a certain level of proficiency. The unit likely achieves its peak proficiency around the time of a major training event like a deployment to the National Training Center (NTC). In anticipation of such an event, the unit temporarily stabilizes its personnel and its members train together. The unit does not maintain its increased proficiency for long,

however, because 40 to 50 percent of its people are typically rotated out of the unit within 4 months of returning to the unit.

The smoothly increasing curve depicts our hypothesis that personnel who serve together for prolonged periods in the same unit would achieve a higher degree of unit effectiveness than would be achieved by units under the Current System. At the time that it is formed, such a unit might well be less effective than a unit in the Current System, because none of its members would have trained together as members of that unit. Over time, though, a unit with stabilized membership would improve and become more effective than a unit in the current system. Its superior effectiveness would result in part from the fact that it would not have to re-learn the basics; instead, its members could perfect individual and unit skills while training together over a longer period. In addition, greater combat effectiveness ought also to result from greater unit cohesion.

We have identified our conclusions about the impact of cohesion on combat effectiveness as our hypothesis because we have been unable to find empirical evidence that directly relates the two phenomena. The Army Research Institute is currently working on this issue, but its results will not be available for some time. There is ample historic evidence of the strong positive link between cohesion and combat effectiveness, however, and every expert we consulted assured us that our hypothesis was correct for ground, naval, and air forces. We eagerly anticipate additional research into this area. Nevertheless, if the hypotheses just described are correct, then, for any given endstrength, the Services could produce a more effective fighting force by organizing in such a way that the Current System was replaced by a system that kept individuals in units for prolonged periods and took other steps to increase the cohesion of those units. Immediately below, we describe some policies that the Services could adopt to this end.

c. Measures That Build Cohesive Units

The measures described here represent broader applications of policies that one or more of the Services have tried to implement, at one time or another, but that are not in general use today. We reviewed each of these policies, and others, as part of our research and have listed below the policies that we believe will promote the development of more cohesive units and that are capable of implementation in each of the Military Services. We believe these policies are complementary, but we are also confident that the adoption of any of these policies will improve cohesion in the units to which they are applied.

- **Reduce Turbulence.** Once individuals are assigned to a unit, keep them there for prolonged periods. Apply this principle to everyone assigned to a unit. (Such assignment practices would differ from the Army's COHORT program. COHORT applies only to first-term soldiers, not officers and NCOs.)
- **Increase Familiarity.** Change assignment practices so that, whenever possible, unit members have served together before. Also, ensure that long-service personnel have recurrent tours in the same larger unit (e.g., the same division in the Army, the same destroyer flotilla in the Navy, or the same wing in the Air Force).
- **Replace Losses in Blocks.** When a unit requires replacements owing to combat or other large losses, transfer those replacements in as a group. For example, replacements for first-term attrition in peacetime should come in "packages" of people that have been undergoing basic training together. In combat, units that had suffered losses would be pulled out of combat and reconstituted with "packages" of replacements who had trained together; those units would train with their replacements before returning to action.
- **Recall Individual Ready Reservists To Serve with Former Comrades.** In the event of mobilization, plan to recall Individual Ready Reserve (IRR) personnel to form units comprised of people that served together while on active duty. (We call this practice "unit-affiliated recall.") The commanders of those units should keep in touch with their IRR personnel and make them feel that they remain valued members of their former unit. The same principle could be applied to IRR personnel recalled to Selected Reserve units.
- **Recall Retirees To Serve with Former Comrades and Perform Former Tasks.** DoD can best exploit the expertise of its retired personnel in the event of mobilization if it changes how it plans to use them. Consider individuals who were members of combat units just prior to retirement. For the first few years these personnel are retired, each Service should plan to call them back to serve with individuals who were also members of those combat units. (Many military enlisted personnel retire in their late thirties or early forties and can handle the physical demands of combat.)

  Now consider older retirees and individuals that were not in operational units just prior to retirement. Each Service should plan to call them back to serve in non-operational jobs, similar to those from which they retired. This practice, which we call "former billet recall," would permit retirees to free active-duty personnel to return to operational units in the company of others with whom they had served in such units.

The principles just described can also be applied to personnel who retire from the Selected Reserve. Each Service should issue retirees standing orders that reflect such plans. (We hereafter refer to such orders as "hip-pocket orders.")

- **Personalize Personnel Management.** The Services' personnel practices currently rely on a centrally managed and computerized individual replacement system. This system treats most active-duty personnel--and all members of the IRR--as replacement parts for a vast machine; they are identified by military occupational specialty (MOS) designators and other "objective" data.

  In the UCM, however, personnel practices permit individuals' careers to be managed on a more personalized and less centralized basis (e.g., at Division level in the Army). The objective is to increase unit leaders' ability to manage the career incentives of their personnel and to establish a career-long affiliation between particular individuals and their units, in a manner akin to the British Regimental system. The Services might achieve this objective in various ways, including decentralized promotion, assignment, and recruiting.

d. Implementation of Cohesive Unit Policies

Increasing the focus on building cohesive units raises challenges to all of the Services who have developed many personnel policies designed to promote individual equity (often at the expense of cohesive units). Adding Cohesive Unit Policies to current systems will require changes in those systems. For example, one of the primary causes of turbulence in today's units is the movement of individuals from job to job in search of a promotion. In a cohesive unit much of this movement will be eliminated and other ways will have to be found to reward individuals. One possible solution would be to promote individuals without needing a vacancy as long as they meet the criteria for promotion. Another would be to change the pay scales to give more weight to time in service and proven proficiency in a particular job and less weight to grade. In the British and Canadian armies, which are characterized by long service, cohesive units have developed ways to meet both individual and unit demands.

2. Ready-Standby Organization

We use the phrase "Ready-Standby Organization" (RSO) to refer to a set of policies that would significantly change the relationship between individual Service members and the units in which they serve, both while they are on active duty and afterward. To implement such policies, a Service would have to make significant changes in current assignment, promotion, and transfer practices and create new patterns of service for

individuals assigned to units. For combat units, RSO involves a cycle during which a group of individuals would form a unit, serve on active duty, remain subject to recall as a unit after active service together, and eventually disband. (Figure I-2 depicts the composition of a combat unit as it moves through this cycle.) Under RSO, a support unit would never disband, but the individuals assigned to it would go through a similar cycle of active service in the unit followed by a period in which they would all be subject to recall together to that same unit.

a. The Combat Unit Variant of Ready-Standby Organization

Under RSO, combat units would move through different readiness/training stages with different mixes of full-time personnel, part-time personnel, and former-service personnel at each stage. We have coined the terms "Ready," "Standby," and "Call-Up" to refer to these stages and to the status and composition of a unit as it moves through them. The shadings in Figure I-2 illustrate the following breakdown of a unit's personnel: the fraction that would serve full-time with it; the fraction that would be "double-hatted," (i.e., assigned to the unit but also performing a full-time job elsewhere in the Service); and the fraction that would comprise personnel who had retired or entered the IRR.

We describe Ready, Standby, and Call-Up units below. Note that, in our schema, some "Standby" units may well be as proficient--even more proficient--than some "Ready" units; thus, the connotations of "Ready" and "Standby" are not necessarily a good guide to the combat effectiveness of these units. Note further that the makeup of Ready, Standby, and Call-Up units varies from Service to Service in ways detailed in Chapters III through VI. Finally, note that, apart from ships' crews, units will typically spend several years in Ready status followed by more than one year in Standby status. (In the Navy, by contrast, we propose one year in Ready status alternating with one year in Standby status.)

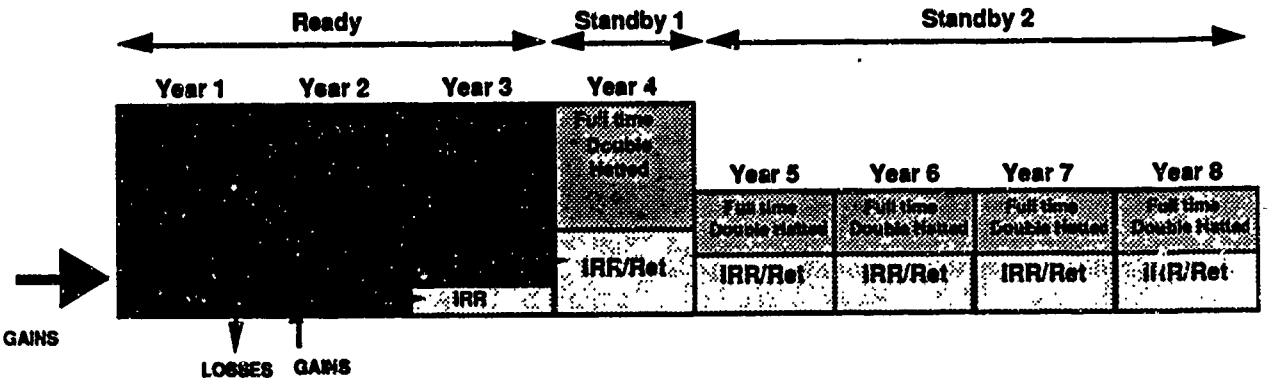

Figure I-2. The Combat Unit Variant of Ready-Standby Organization

Ready. Ready units would typically be formed from two groups: (1) junior officers and first-term enlisted personnel that recently finished training together, and (2) NCOs and officers that had served and trained together in the past. Members of Ready units would commence training together and, owing to minimized turnover over the period that the unit's members served together, would reach a higher level of training proficiency and unit cohesion than do full-time units today. (The term of full-time Ready service together would typically be 3 years for ground units, as shown in Figure I-2, but it could be less.)

In the regular Army, Navy, Air Force, and Marine Corps, Ready units would be composed almost entirely of full-time personnel. In some cases, however, an individual that served with the unit for a prolonged period and then left active service could remain a member of the unit while it remained in Ready status manned by people with whom he served.

Units from other parts of the total force could be in Ready status even if many of their members were not full-time. In the Air National Guard, for example, Ready tactical fighter squadrons could be composed (as they are today) of a mix of full-time and part-time personnel.

Standby. Standby units would typically be composed of a mix of full-time personnel and former-service personnel. We distinguish two types of Standby units here and introduce further distinctions in the course of describing the application of the Ready-Standby concept to each Service. For reasons described later, creation of Standby 1 and

Standby 2 units would permit us to quickly mobilize the same number of units that we can mobilize under the current system with fewer active duty people assigned to those units.

Standby 1 Units. After members of a Ready unit completed a training cycle together, they would move on. Some would reach the end of active service or retire. Those that remained on active duty would become "double-hatted" and would be assigned to advanced training or to jobs in the non-combat organizations of their respective Service (e.g. recruiting). Although this possibility is not depicted in Figure I-2 and is not a necessary element of Standby 1 status, some members of the unit might remain assigned to full-time jobs for that unit, such as equipment maintenance.

Here is what's critical about Standby 1 status: unit members still on active duty would not be assigned to duty with another operational unit, nor would the unit be disbanded or filled with a new set of people. Instead, each former member of the unit--even those in civilian life--would retain hip-pocket orders; in the event of mobilization anytime in the first year after the unit left Ready status, they would be called back to serve with the same people with whom they had served as members of that particular Ready unit. Because of the high levels of cohesion and expertise created while it was in Ready status, the Standby unit ought to be able to restore its combat effectiveness fairly quickly in an emergency.

Standby 2 Units. After a one-year period on the rolls of a Standby 1 unit, personnel would be re-assigned in one of two ways. Some would move to newly forming "Ready" units. For example, individuals completing an NCO school while on Standby 1 would become NCOs in a new Ready unit.

Other former members of the unit would, at the end of the year in Standby 1 status, enter a category we call Standby 2. Active-duty personnel would remain in this status until they returned to a Ready unit. Members of the IRR would remain in this status, subject to recall, for as long as their service obligations lasted. Retirees would remain in this status until most of the people with whom they had served were no longer in Standby 2 status; at that time, retirees would remain subject to recall, but for service in other roles.

To avoid understrength units that would otherwise result, units in Standby 2 status would be formed by uniting two or three groups of service people who had served in different units while in Ready and Standby 1 status. (Figure I-2 shows how a single unit would move from Ready through Standby status over 8 years. The rectangles depicting Standby 2 status are smaller, since the unit would not have all the people that served in it

while in Ready and Standby 1 status. Two or more understrength units of the sort represented by those small rectangles would combine to form a Standby 2 unit). Once implemented, this practice would likely lead to formation of overstrength units, which would be desirable for two reasons. First, acceptance of overstrength units ought to help eliminate the prospect that individuals that had trained together in a Ready unit would be separated from each other when in Standby 2 status, thus diminishing unit cohesion and proficiency. Second, Standby 2 units would have no source of replacements; overstrength at time of formation would enable them to withstand peacetime attrition over the period in Standby 2 status.

Since their members would likely come from different units (albeit different units in the same larger formation, like an Army Division), Standby 2 units would not display the levels of cohesion that we would expect of Standby 1 units. Still, personnel could be assigned to these units in such a way that cohesion would be much greater than is typical under the current system. For example, individuals from the same Standby 1 unit might be kept together by consolidating companies into platoons and battalions into companies.

Many double-hatted active duty members of both Standby 1 and Standby 2 units will be filling important wartime jobs even though they are in the non-combat organizations of their Service. Their Service will not be able to leave these positions empty in a crisis. In order to assure that double-hatted members are free to return to their Standby units, other individuals must be able to step into the jobs they leave behind. One of the Cohesive Unit Policies would be applicable in this case. If these positions in the non-combat force were backed up by retirees or members of the IRR who had previously held these jobs, their current incumbent could return to his Standby unit and be replaced immediately by a fully trained individual. Alternatively, the Service could establish individual positions in the Selected Reserve that would allow them to replace double-hatted individuals rapidly.

Call-Up. The Services could assign NCOs and officers who were not on active duty or assigned to units in Standby status to "Call-Up" units. Upon mobilization, these officers and NCOs would be recalled to lead such units, which would be filled with recruits who would begin training as a unit.

Call-Up units could be employed in one of two ways. If equipment were available, they could be deployed to fight like any other combat unit. (Of course, they would first have to train for longer periods than would already-existing Ready or Standby units.) Alternatively, they could provide "packages" of trained personnel for use as replacements.

In either case, the newly recruited members of the Call-Up unit would be assigned only to the larger unit of which they had been made members ever since they had entered the military. For example, a newly enlisted member of a Call-Up unit would be recruited not simply into the Army but into, for example, the 25th Infantry Division. His Call-Up unit would either eventually deploy as a component of that division or send many of its members, once trained, as a replacement package for, say, an understrength battalion in that division. Call-Up units would be especially important for infantry and armor units that suffered high attrition in combat.

b. Hypotheses on UCM Policies and Unit Effectiveness

Figure I-3 depicts our hypothesis concerning unit effectiveness under (a) a system that adopts Cohesive Unit Policies and RSO and (b) the Current System. (Recall that this phrase refers to current manpower practices and in particular to reliance on individual replacement and the absence of any plans for unit-affiliated recall of IRR and retired personnel.)

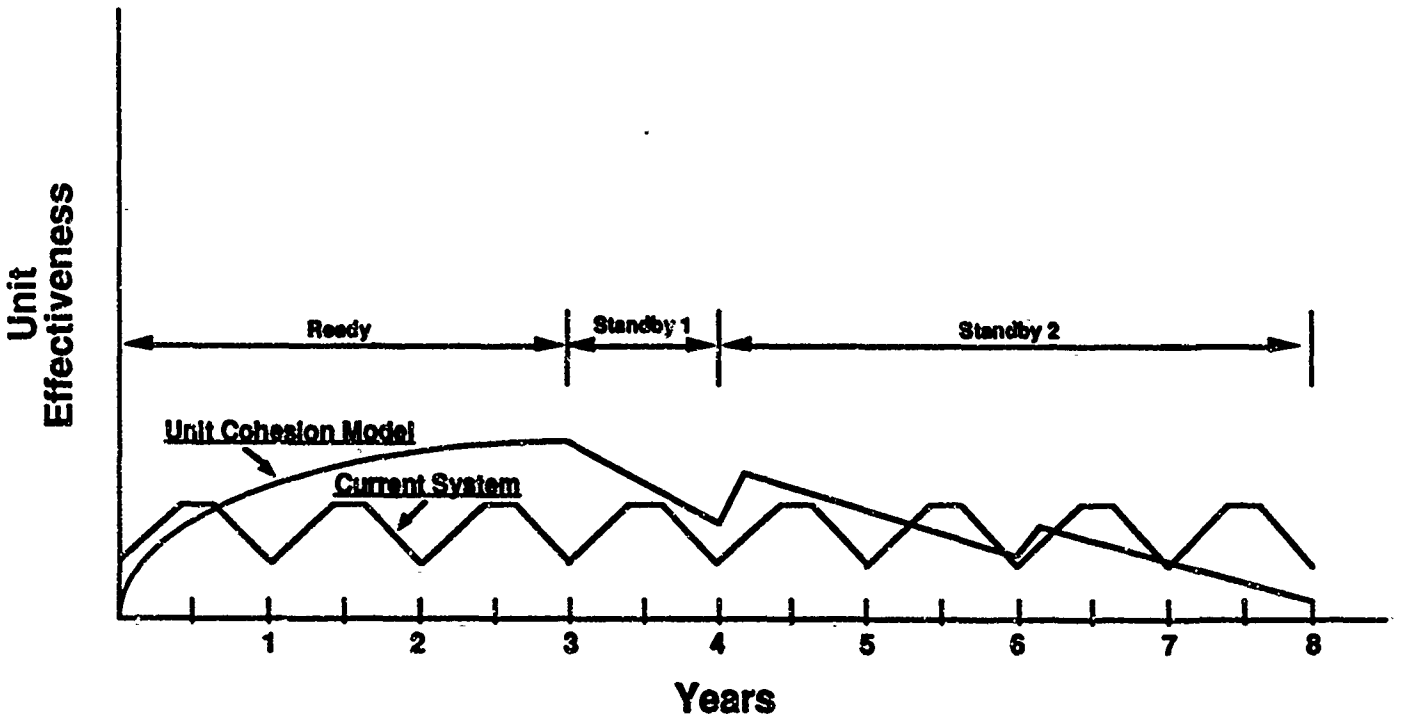

Figure I-3. Combat Effectiveness Hypotheses: UCM Units vs. Current System Units

As in Figure I-1, the sawtooth curve represents our characterization of unit effectiveness over time under the Current System. Similarly, the smoothly increasing curve depicts our estimate of unit effectiveness in a unit whose members served and trained together with minimal personnel turbulence for a prolonged period (i.e., a Ready unit).

After year 3, the unit depicted leaves Ready status and becomes a Standby 1 unit. For the first few weeks or months in Standby 1 status, the unit would remain virtually as combat effective as it had been at the end of its Ready period. Over time, however, its effectiveness would fall. The rate of decline over time is an important issue for further research; however, our hypothesis is that the unit would be able to regain its previous levels of effectiveness fairly quickly if it were recalled anytime during its Standby 1 year. (Owing to their long prior service together that ended less than one year before, unit members would know each other's strengths and weaknesses at various tasks and would likely be able to refresh previous skills and learn new ones more quickly than would an otherwise comparable group.)

After one year in Standby 1 status, some members of the unit could be re-assigned to newly forming Ready units. Others would be assigned to a Standby 2 unit whose members had served together in Ready units one year previously. At the outset of this unit's year in Standby 2 status, its members could be brought together for a few weeks of training together; the steep increase in the curve depicting the unit's effectiveness reflects our hypothesis concerning the effect of that training. The curve peaks at something less than the effectiveness level that the unit attained at the end of Ready status; this reflects both the effects of time passing and the diminished cohesion that one should expect in light of the fact that Standby 2 units comprise individuals that served in at least two different Ready units. Unit effectiveness would begin to fall once refresher training was finished. It might be restored somewhat by a second period of refresher training. (Figure I-3 depicts the effects of such training at the beginning of year 6.)

The effectiveness of units produced by such a system is an empirical issue that warrants further study. Even so, if the hypotheses just described are even roughly correct, then, for any given budget, the Services could produce a larger force of readily mobilizable, fully trained, and highly effective units by adopting RSO and Cohesive Unit Policies.

c. The Support Unit Variant of Ready-Standby Organization

Under RSO, combat units would form at a given time, move through the cycle just described, and then disband. Support units would never disband. Instead, individuals assigned to a support unit would go through the cycle depicted in Figure I-4. During their first few years in the Service, the individuals destined for support units would go through their initial training followed by specialized technical training. Upon completing their training, these individuals would go through a cycle in which they would be in Ready status while on active duty with the unit, and in Standby status afterwards.

The dark-shaded blocks in Figure I-4 depict not three units, but the members of a single unit that are serving in their first, second, and third year, respectively, as full-time members of that unit. (We rounded the corners of the blocks in Figure 1-4 to differentiate them from the rectangles in Figure 1-2 and thus underscore the point that they represent year cohorts within one unit.)

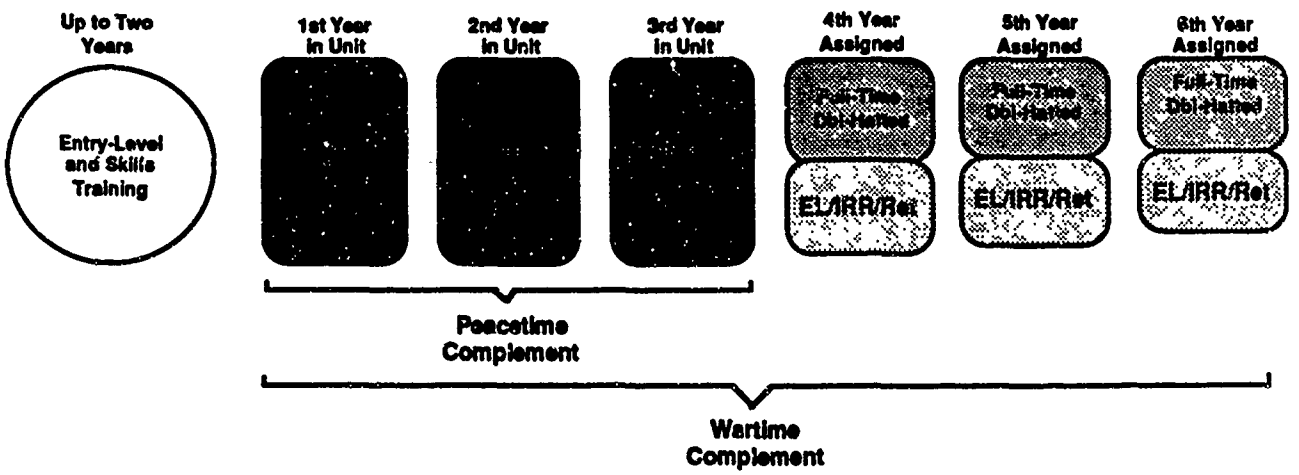

Figure I-4. The Support Unit Variant of Ready-Standby Organization

Similarly, the lighter-shaded blocks in Figure I-4 depict other members of the same unit who have completed active-duty service with that unit. Some have moved on to other full-time jobs in the Service but remain "double-hatted" in that they will return in the event of emergency. Others have left active service and retired or entered the IRR; they, too, will rejoin this support unit in the event of emergency.

Ready-Standby Organization involves a different pattern of service for support units for several reasons. First, cohesion is not as important in support units as it is in combat units. Second, support units are composed of specialists whose training requires anywhere from 6 months to almost 2 years. Thus, it is virtually impossible for all members of support units to serve together from entry-level training through the time they are assigned to operational units. Finally, support units have to cope with a higher operating tempo in wartime and need more personnel to do so. With the manning pattern just described, support units could be sized to handle peacetime demands most of the time and to expand to meet the increased demands of wartime service in the event of mobilization.

3. Inactive Service Reform

a. Mandatory Inactive Service Extension

Both Cohesive Unit Policies and Ready-Standby Organization could work without changing current law or procedures for managing the Individual Ready Reserve. However, both policies would work better if enlisted personnel were required to include a 4-year inactive service commitment every time they extended their active duty service obligation and if officers were retained in the IRR for 4 years regardless of the length of their active service. Consider an individual who enlisted for 4 years and then decided to enlist for another 4. Under current law, his total 8-year obligation would end at the same time as his second 4-year tour. Under the change proposed here, every time he contracted to extend his active service obligation, he would also incur a 4-year inactive service commitment. This change would make Standby units both more cohesive and more proficient, since highly experienced former members of the unit would be available for recall.

Note that the Services could adopt a mandatory inactive service extension even if they chose to retain the individual replacement system and decided against adopting other UCM policies. To emphasize this point, we listed this policy not with Cohesive Unit Policies but under the category of Inactive Service Reform.

b. "Extended Leave" Status

Another change in inactive service policy would facilitate recall of Standby 1 units. This option would involve changing current procedures so that individuals who left full-time service would not only remain assigned to their unit but would also be on "extended

leave from active duty" with that unit during its year in Standby 1 status. (We hereafter refer to this idea as "Extended Leave.") Extended Leave might involve some modest compensation as an indication to service people and the public at large that Standby 1 units and all their members could quickly be sent to fight in the event of mobilization. At the completion of one year on Extended Leave, each individual would enter the IRR. For convenience, we hereafter refer to the combination of one year on Extended Leave followed by IRR service as "EL/IRR" status.

The Extended Leave idea is designed to avoid objections that might otherwise arise if members of Standby 1 units were recalled prior to Selected Reservists. If a mobilization occurred when an active-duty serviceman was on 30 days' leave from his unit, no one would argue that he should be recalled only after paid Selected Reservists were recalled. The point of Extended Leave--and especially of the provision for paying individuals something while in this status--is to obviate parallel objections to recalling members of Standby 1 units.

Opposition to this concept may come from two sources. The Reserve community may argue that it is inappropriate to keep individuals in the Active Component when they are not serving fulltime with active units. The Congress will have to provide funding to support this concept and may resist giving the Executive Branch the new ability to callup Standby units without mobilizing any element of the Reserve Component.

4. Alternate Patterns of Selected Reserve Service

Figure 1-5 depicts a range of options for the Services concerning the use of Selected Reserve personnel under the UCM. The rectangle labeled "Ready" depicts the option of relying on a particular Selected Reserve unit to augment a Ready unit, in the event of mobilization. This is a simple extension of the current practice of relying on some Selected Reserve units to augment full-time regular units. The rectangle labeled "Standby" depicts the option of relying on a particular Selected Reserve unit to augment a Standby unit. Both of these options assume that the regular component adopts RSO for at least some of its units.

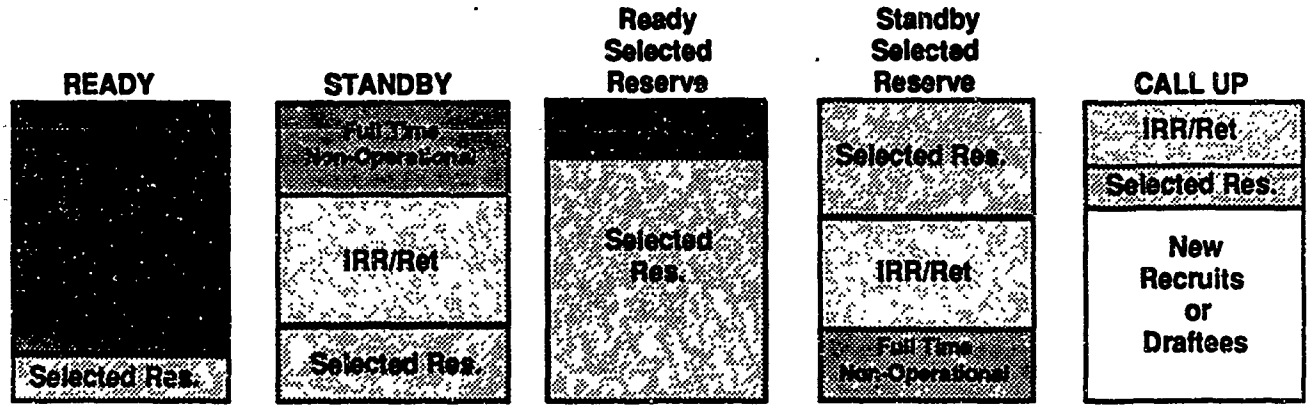

Figure I-5. Alternate Patterns of Selected Reserve Service

The rectangles labeled "Ready Selected Reserve" and "Standby Selected Reserve" depict options associated with adopting RSO for the Selected Reserve. Ready Selected Reserve units would comprise some Selected Reserve personnel on duty full-time and some on duty part-time. These units would be exactly analogous to the Selected Reserve units that exist today. As today, their level of full-time manning would vary from relatively low levels for Army combat units to relatively high levels for tactical fighter units. Standby Selected Reserve units have no analogs in the current force. A unit in the Standby Selected Reserve would comprise drilling Selected Reservists, IRR and retired personnel that had served together in the Selected Reserve, and, possibly, "double-hatted" personnel who have full-time jobs in either the Selected Reserve or the non-operational part of both the regular and reserve components, e.g., active or reserve recruiters. The rectangle labeled "Call-Up" illustrates the point that Selected Reservists could provide trained and experienced personnel to Call-Up units, in the event of mobilization.

Regardless of the choices a Service makes among the above options, a decision to implement RSO for the "regular" Army, Air Force, Navy, or Marines raises questions concerning entry into the Selected Reserve. On leaving active service in an active-component Ready unit, of course, some individuals may choose to enter the Selected Reserve. Here are two ways to handle the Selected Reserve that are consistent with RSO:

- If individuals want to enter the Selected Reserve after ending active service with a Ready unit, allow them to do so and relieve them of the obligation to rejoin the Standby 1 unit to which they would otherwise be recalled in the event of mobilization. This alternative would be attractive if only a small fraction of ex-Ready unit members decided to join the Selected Reserve; it

would reduce the strength (and perhaps the cohesion) of Standby 1 units if a large fraction did so.

- Permit individuals who joined the Selected Reserve on leaving active service to drill with their Selected Reserve units as they do today. If mobilization occurs when their active-duty unit is in Standby 1 status (i.e., during their first year after completing active service), recall these individuals to service with their active-duty unit, not with their drill unit in the Selected Reserve. At the end of the Standby 1 period, drop these individuals from the rolls of the units of which they were members while in Ready and Standby 1 status and plan to mobilize them with their Selected Reserve unit. This option would preserve the strength of Standby 1 units.

D. ASSESSMENT OF THE UCM

1. Simulation

To understand the impact of Cohesive Unit Policies, Ready-Standby Organization, and Inactive Service Reform on the military manpower system, IDA developed the Unit Personnel Tracking Model (UPTM) to simulate the flows of people under the three UCM policies and under the Current System. (For expository convenience, the balance of this section refers to these three policies as "the UCM." We again use the term "Current System" to refer in general to existing manpower practices and in particular to a system that is the antithesis of the UCM: it relies on individual replacement rather than Cohesive Unit Policies; its mobilization plans treat former unit members as interchangeable replacement parts [rather than as individuals with human ties to the others with whom they once served]; it does not provide for mandatory inactive service extension.)

We developed the UPTM to assess the consequences of organizing the Services along UCM lines. We wanted to be able to compare the effect of UCM policies and the Current System on such dimensions as the need for recruits and the feasibility of creating a 50-50 mix of Ready and Standby units under various conditions of re-enlistment and first-term attrition. We also wanted some means of making an objective assessment of each system's prospects for building cohesive units. The balance of this section describes UPTM structure and results; see Appendices A and B for further detail.

a. Model Structure

The UPTM can be thought of as an accounting tool that shows how various dimensions of a manpower system would change over time. To use this tool, the user

specifies values that describe a group of military personnel and a set of units at the outset of the simulation. (Values that describe units include their number and strength, the number of senior personnel in them broken down by term-of-service, and so on. Values that describe the group of military personnel include the number of full-time personnel that are not assigned to units but could be so assigned if needed.) The user also specifies parameter values that are used in calculating how the number and composition of units would change over time. (These parameter values include the peacetime attrition rate, the re-enlistment rate at the end of each term of service, and the fraction of senior personnel required in newly forming units.)

Given user-input values of the sort just described, the model performs a series of calculations to determine the values that would describe the personnel and units one year later. To simulate the passage of a year for personnel, for example, the UPTM:

- Applies peacetime attrition factors to determine the number of personnel that leave the Service and will not return (e.g., those that die or are discharged as unfit).
- Calculates the number and grade of people needed to form the desired number of units.
- Calculates the number of people that should therefore be assigned to units.
- Updates personnel records to reflect one more year of service for all Service personnel, and to determine the numbers that transfer to EL/IRR status or retire.

To simulate the passage of a year for units, the UPTM computes:

- The number and strength of the units that could be formed from available personnel.
- The "Familiarity Index" (FI) for the unit (i.e., the average period of time that each pair of individuals in the unit have trained together to date, summed over all possible pairs).

The Familiarity Index can be viewed as a proxy measure of unit cohesion but not as a proxy measure for unit effectiveness. (Unit effectiveness is a function not only of cohesion and related attributes like proficiency, but also of factors not at all related to cohesion, like weapons effectiveness and logistics support.) Even as a proxy for cohesion, FI has clear limitations. (For example, FI does not help us understand how cohesive feelings would diminish over time. To see this point, imagine one unit whose members have served together for the past 3 years and another whose members also served together

for 3 years but did so 10 years ago and have not served together since. If other things were equal, the former unit would clearly prove more cohesive. However, since both units' FI is 3, the Familiarity Index does not reflect this difference. Of course, it's possible to imagine applying some "discount rates" to reduce FI to depict the effect of time passing, but we do not know what these rates should be.)

b. Model Results

We used the UPTM to simulate the operation of the Current System and the UCM given that each was to produce 12 readily mobilizable units. The results showed that the Current System could achieve this objective across the range of cases we examined--first-term re-enlistment rates varying from 25 percent to 75 percent, and first-term attrition ranging from 5 percent to 20 percent annually. The results also showed that, regardless of the first-term attrition rates considered, the UCM could not achieve this objective if the first-term re-enlistment rate was 25 percent, but could if that rate was 50 or 75 percent.

Results with respect to unit strength showed a similar pattern. Current System units in all cases were able to maintain full strength (1,000 in our UPTM runs); UCM Ready and Standby 1 units nearly achieved the same level except in the admittedly extreme case of 20 percent annual first-term attrition. (In that case, Standby 1 unit strength was a little under 900 personnel per unit.)

Results with respect to recruiting requirements are not surprising. Each year, the "Current System" set of 12 full-time full-strength units requires roughly twice as many recruits as the UCM set of 6 full-time full-strength units. (Under the UCM, of course, the other 6 units of the 12 desired are in Standby status and do not require a full-time full-strength complement.)

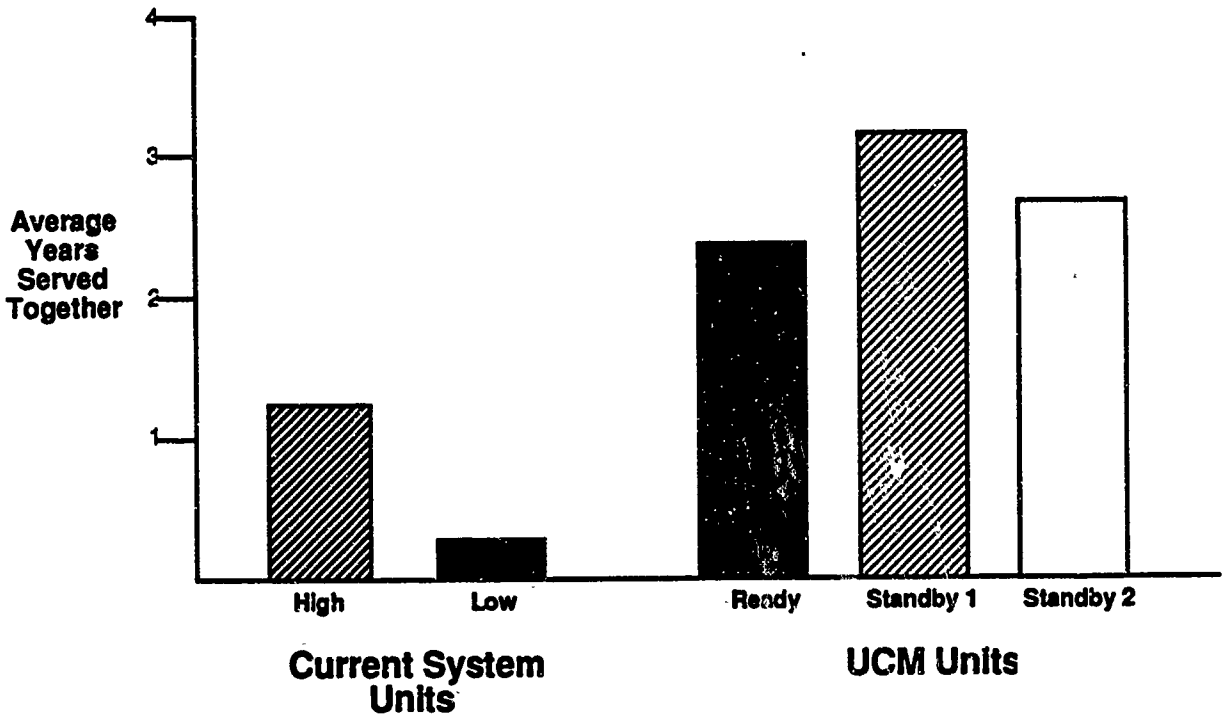

Figure I-6. Familiarity Index Comparison

Figure I-6 depicts UPTM results concerning the Familiarity Index. These results depict a striking contrast between the two systems. UPTM runs show that the *lowest* FI levels achieved by UCM units are roughly double the *highest* levels produced by the Current System. Since cohesion and fighting effectiveness depend on the degree to which the men in a unit know each other and have served together, these FI results suggest that--other things equal--the UCM could produce significantly more effective units than does the Current System. The results in Figure I-6 are discussed further in Appendix A.

2. Implementation

In the development of options for each Service, we have sought to design policies that would prove feasible to implement. While the Congress would likely wish to participate in the decision to implement UCM policies, the concepts themselves appear to be consistent with current law. Most aspects of the UCM can be implemented with simple changes of current procedures or regulations. For example, all the Services have procedures for assigning members of the IRR or retirees to positions upon mobilization. They could make these assignments more easily in peacetime by adopting unit-affiliated recall, so that the majority of individuals would simply return to their previous units.

Revision of re-enlistment contracts to include a mandatory inactive service extension and creation of an Extended Leave category also appear to be consistent with current law. (Of course, Congress would have to act before the Services could pay individuals on Extended Leave.)

Many elements of the UCM already reflect current or past practice in each of the Services. The Army's COHORT system and the Marine's MEU/SOC reflect partial application of Cohesive Unit Policies; as described in Chapter IV, Navy practices for undermanned Destroyer Escorts during the Vietnam War are the model for the Naval Application of RSO; Air Force use of augmentation personnel in the Military Airlift Command and the current structure of Air Force Reserve and Air National Guard units are, in part, the model for applying RSO to Selected Reserve units.

While further research on the Services' ability to manage manpower flows is needed before RSO can be implemented for ground combat units, the idea of using "Standby" (i.e., EL/IRR, double-hatted, and retired) personnel could be implemented quickly, in all services. Units that could use such personnel include both support units and (almost certainly) Standby aircraft squadrons associated with Ready aircraft squadrons.

Although some policies might be readily adopted, the implementation of UCM policies is not a simple matter. Several major issues require further analysis; creation of "test-bed" units would be advisable before the UCM is implemented service-wide. See Section 5, below, and Chapter VII for discussion of further research.

3. Using UCM Policies To Respond to Budget Reductions

Each of the Services faces the prospect of cuts in its budget. In conjunction with the longer warning times generally assumed with respect to military threats from the Soviet Union, UCM policies provide ways in which the Services could respond to such cuts without reducing the total number of units they now have. Table I-1 shows that, given hypothetical reductions in annual budgets in the range described, each Service could respond by converting the specified fraction of its force to Standby status.

Table I-1. Illustrative Responses to Potential Future Budget Cuts Relative to the FY90 Budget and Force

Hypothetical Reductions in Annual Budgets (FY90 $Billions)					Fraction of Operational Force Converted to Standby in Response
Army	Navy	Air Force	Marines	DoD Total	
3	2	3	.5	9	10%
8	6	7	2	23	25%
16	13	14	3	46	50%

Table I-1 reflects the assumption that the Services would accord highest priority to preserving force structure (i.e., the number of readily mobilizable and fully trained units) and a lesser priority to maintaining readiness as conventionally understood (i.e., the ability to quickly send units of the regular component into action). Our analysis suggests that the UCM offers the prospect of drastic reductions in active-duty manpower with no reduction in the time required for Ready units to be prepared to fight, and at only a modest cost in the time required to make the entire force ready for combat.

It's also worth emphasizing that the budget reductions in Table I-1 dollar figures ought not be interpreted as funds taken away from the Services. In an era of reduced budgets, the Services may want to allocate scarce funds to procurement and modernization instead of O&S spending and military pay. Adoption of UCM policies provides a way to do so with little or no reduction in overall force structure.

Several other points are worth noting with respect to the figures in Table I-1. First, its figures are rough estimates based on the methodology described in Appendix C. Further research is required to refine them. Obtaining definitive answers will prove challenging since, for example, we have no experience with the actual costs of units in Standby status. Second, its dollar figures represent reductions in operating costs that might *eventually* be achieved once RSO had reached a steady state status. These reductions could not be achieved overnight; instead, annual reductions of this magnitude would be feasible only after a number of years devoted to implementing UCM policies.

4. Implications of UCM Policies for Operation Desert Shield

In thinking about applying UCM policies to the Military Services, it may be helpful to consider how Operation Desert Shield might have been affected had UCM policies been in effect.

Although the implementation of Ready-Standby Organization would have created major changes in the immediate availability of large units, there would have been sufficient Ready forces available to deploy to the area on essentially the same time schedule as was accomplished by today's forces even if fully 50 percent of current active component forces had been in a Standby status. The arrival of some Navy ships would have been delayed since peacetime forward deployments would have been reduced with RSO; on the other hand, RSO would have preserved a larger sized Fleet overall and thereby would have provided a larger rotation base in the event of protracted commitment.

The Army might not have been able to deploy the entire 82nd Airborne Division had part of the division been in Standby status but, as actually occurred in the deployment of the 24th Mechanized Division, it could have augmented the division with another brigade. Under RSO the Marines and Air Force would have been able to deploy pretty much as they did: the Marine Expeditionary Force (MEF) and the Air Force wings were composed of pieces of peacetime units. (The MEF was built up with units from both coasts, from Hawaii, and from Japan. Complete Air Force wings were not deployed; instead the Air Force deployed full-strength squadrons built from the resources of entire wings.)

Implementation of RSO prior to Desert Shield would imply different practices when it became necessary to rotate units. Given RSO, a reduced number of Ready units might well require the Military Services to activate Standby units to replace Ready units. Currently, active duty units can be used to replace those in the desert. If budgets had been cut significantly and RSO had not been adopted, however, fewer units would be available for rotation purposes.

There appear to be plans to activate some Selected Reserve combat units now that the DoD has been given authority to keep these units on active duty for up to one year. Had Inactive Service Reform been implemented along with RSO, the Extended Leave provisions would have made it easier to recall Standby units, and a mandatory inactive service extension would have made a greater number of fully trained personnel available for recall.

RSO would likely have had an immediate impact on support units if these units had reduced their Ready manning levels to the levels necessary to support peacetime activities. In this case, as actually occurred, it would have been necessary to activate reservists and retirees to meet the support needs of the combat units. Again, however, consider the situation if (1) budget reductions had forced the Services to reduce the number of personnel assigned to support units, (2) RSO had not been adopted, and (3) DoD had then to conduct Operation Desert Shield. In such a situation, continuation of current practices would leave DoD much less prepared than it would have been if it had adopted RSO and other UCM policies.

Implementation of Cohesive Unit Policies would have had a positive impact on Desert Shield since the units that deployed would likely have proven more proficient and better trained than units produced by the Current System. If it became necessary to recall IRR and retired personnel, moreover, the UCM practice of organizing these people into cohesive Standby units would almost certainly produce more effective fighting organizations than would use of them as individual replacements.

5. Topics for Further Research

The UCM policy options described above raise a number of issues for further research. We summarize such issues in this section. Chapter VII discusses them in further detail. (Chapter VII also lists research topics that arise from the non-UCM policy options summarized in Chapter II.)

a. Testing Hypotheses About Long Service, Cohesion, and Effectiveness

Figures I-1 and I-3, above, depict hypotheses which raise several issues for further research.

Comparative Effectiveness Assessment. Most broadly, what should be the shape of the Current System and UCM curves, and their relative height? More concretely, how should we measure unit effectiveness?

Effectiveness of Standby Personnel and Units. How does the potential contribution of retirees and IRR personnel change over the time they spend in inactive service status? How should we estimate the effects of refresher training for such personnel and for entire reassembled units?

Implications of Unit Types and Post-Military Vocations. How would the cohesion-effectiveness relationship differ across different types of units and different types of post-military vocations?

b. Implementation Issues

Test-Bed Issues. What is the minimum-sized unit required to fairly test all aspects of the UCM? Can it be conducted at the unit level or must an entire base or installation be involved?

Issues in Personalizing Personnel Management. What are the obstacles to decentralizing authority for such personnel management functions as promotion and assignment, and how might the Services overcome them? How might the Services assure equity in managing individual careers across an entire Service? What are the advantages and disadvantages of regional recruiting for combat units? What would be the worries of officers and men if the Service decided to adopt UCM policies, and what options should be considered to ameliorate these concerns?

Stocks and Flows Issues. What must the Services do to phase in Standby units in such a way that they achieve desired proportions of personnel at each experience level not only initially but also as the units "age" through the proposed cycle? What must they do to ensure the desired skills mix in all units across the Service?

Lessons of the Past. What are appropriate lessons to learn from the history of previous attempts to implement partly similar policies (e.g., the Army's COHORT program)?

c. Cost Issues

Overhead Changes. What are the implications of UCM polices for infrastructure and overhead costs? (This is hard to estimate since we have no historical experience with, e.g., Standby units.)

Personnel Proportion Issues. What mix of double-hatted active, IRR/EL, and retired personnel would prove most cost-effective for different kinds of Standby units?

Cost and Readiness Relationships. What is the relation between particular levels of peacetime spending (on refresher training and equipment maintenance for Standby units, e.g.) and the time required before recalled Standby units are ready to fight?

Transition Issues. What costs would the Services incur in the course of transition to a UCM regime? For example, what would they have to pay to store and maintain various categories of equipment for Standby units? What would be the relation between maintenance/storage spending and the lead-time required to make the equipment fully ready for war?

E. OTHER TOTAL FORCE POLICY ALTERNATIVES

This section lists options for Total Force policy that apply to particular components of the force. With the exception of one UCM application noted below, these options can be regarded as distinct from the UCM.

1. Maintain Overseas Capability with Fewer Troops

The options that fall under this heading are summarized in the Army section of Chapter II and described more fully in Chapter III and Appendix D. As noted later on, one of these options involves implementation of a UCM idea (i.e., application of RSO and Cohesive Unit Policies to Army units based in Europe).

2. Reconfigure the Army National Guard and Army Reserve

Reconfiguration of the ANG and AR is described in the discussions of Army options in Chapters II and III.

3. Change the Way We Use Post-Graduate Pilot Training Units

This option is applicable to Navy, Air Force, and Marine pilot training units and is described in Chapter II.

II. SUMMARY OF SERVICE RESTRUCTURING OPTIONS

This chapter provides a description of an alternative way of using post-graduate pilot training units and brief descriptions of Service options that are described in greater detail in Chapters III through VI.

A. CHANGE THE WAY WE USE POST-GRADUATE PILOT TRAINING UNITS

1. Alternative Assumption

For purposes of this analysis, the pilot training programs of the Air Force, Navy, and Marines can be broken down into two stages: undergraduate pilot training, which imparts initial flying skills, and post-graduate pilot training, which trains pilots to fly the particular aircraft that they will operate once they join tactical units.

Although some of the aircraft used for post-graduate pilot training have been assigned a secondary combat mission, the Services do not organize these aircraft (about 15 percent of active component aircraft) into combat units for overseas deployment or explicitly count them in determining the number of aircraft available to deploy in the event of war.[1] Counting this way reflects either of two assumptions:

(i) that these aircraft are wartime attrition aircraft but cannot be acknowledged as such because of the policy that the Services cannot buy aircraft in anticipation of wartime attrition;

(ii) that post-graduate pilot training should not be suspended, even temporarily, in any future war.

We describe below options that the Services should consider if they choose to accept the former assumption and to question the latter.

Treat Training Aircraft As Wartime Attrition Aircraft. If assumption (i), above, is accepted, three points follow. First, in certain wartime circumstances, the Services will suspend post-graduate pilot training and use the aircraft involved to replace

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[1] As noted in Chapter VI, Marine AV-8 training units constitute one exception to this generalization.

combat losses, as our European allies plan to do. This means that the Air Force now has more aircraft available to fight than are organized into units for the purposes of doing so.

Second, the DoD should explicitly consider buying war reserve spares for the aircraft used for post-graduate training and providing those aircraft with the full range of equipment judged necessary for war. Existing stocks of spares already reflect anticipated wartime attrition, so we cannot assume that aircraft from training units would be able to use the spares earmarked for aircraft in combat units. In addition, many training aircraft lack the range of equipment required for combat.

Finally, if these aircraft are to be used to replace combat losses, the Services have two options for organizing such aircraft that are consistent with the UCM. Section b, below, discusses these options.

Do Not Suspend Post-graduate Pilot Training. Assumption (ii) appears widely accepted within the Services. In the course of our interviews, we heard repeatedly that rejecting this assumption was tantamount to "eating our seed corn" in tactical aviation. Indeed, the lack of war reserve spares and a full range of combat equipment on training aircraft shows commitment to this assumption. We argue below that assumption (ii) is appropriate in some cases but not in others.

The Case Against Suspending Training in Lesser Wars. Postgraduate pilot training units were kept in operation during the Vietnam war and are very likely to be kept in operation during an extended crisis in the Persian Gulf. This procedure makes sense for the following reasons: (1) The Vietnam war was (and the Gulf deployment could well be) of long duration. (2) Replacement pilots were (or will be) required not to replace combat losses but to provide a rotation base and compensate for the loss of pilots to civilian life at the end of their obligated service. (3) Aircraft losses did not (will not) outstrip the ability of the industrial base to provide replacements.

The Case for Suspending Training in Major Wars. Now consider a major war in which (a) the U.S. lost aircraft quickly and had to send more into the fight before the industrial base could increase output for that purpose and (b) owing to the national emergency, trained pilots were not routinely permitted to leave the Services for civilian life. In such a war, the option of temporarily suspending pilot training could prove advisable for these reasons: 1) Each Service will have more pilots than aircraft at the outset of war. 2) In the initial stages of fighting, each Service is likely to have even more pilots per aircraft since some pilots will survive when their planes are lost. 3) It will take a few years before the industrial base can significantly increase aircraft production. 4) An intense and

protracted war could go on to the point that one or more of the Services would have to deploy less-capable aircraft than those in its post-graduate training units if it kept those units in CONUS, training pilots. 5) At that point, and perhaps sooner, the Service could temporarily suspend those units' training missions and use their aircraft for either of two organizational options described below. 6) Post-graduate pilot training units could be re-constituted later on. (The appropriate time to do so would depend on the combat situation and on the anticipated delivery dates of aircraft produced by plants working on a wartime footing. Each Service would aim to re-constitute pilot training units by using combat-veteran pilots [as instructors] and aircraft from two sources. These sources would be (a) the small number of aircraft that would come off production lines prior to the dramatic output increases that would follow from mobilization, and (b) aircraft re-deployed to CONUS for training purposes, should the combat situation permit.)

The Services could plan to temporarily suspend pilot training in wartime. Doing so would permit them to maintain a larger deployable force for any given level of peacetime MilPers and O&M budgets and to commit pilots and aircraft to combat that otherwise would not be taken into account. Adoption of this concept by the Navy, Air Force, and Marines Corps would add approximately 600 modern, tactical fighter aircraft to the size of the deployable force.

2. Options for Organizing Units To Fly Training Aircraft

The idea of planning to use training aircraft to fight is not part of the UCM. We describe below two options for organizing associated personnel that are consistent with the UCM.

Standby Training Squadrons. Each Service could re-organize its post-graduate training squadrons into "Standby Training" units. In peacetime and during some less intense wars, these units would have a full complement of full-time support personnel and a partial complement of instructor pilots (i.e., fewer pilots than a comparably equipped tactical wing would have), just as they do today. However, in the event of mobilization for an all-out war (and possibly in other contingencies), these personnel and the small full-time complement of other Standby units would be augmented by dual-hatted full-time personnel (i.e., individuals that would ordinarily hold jobs in the non-operational parts of their respective Services), by Selected Reservists, and by a mix of Extended Leave/IRR and recently Retired personnel. All of these augmentees would be assigned to their respective Standby Training unit when they left operational units; all could conduct refresher training with it. The Commanding Officer of the Standby Training unit would be their commanding

officer; he would maintain contact with them and involve them in the life of the unit to the extent that his resources allowed.

Package Replacements from Standby Training Squadrons. Under this option, the squadrons themselves do not have to deploy overseas. Instead, following UCM policies, they could deploy both aircraft and packages of replacement personnel to units overseas that had suffered combat losses. These replacement packages would consist of the typical mix of personnel in a Standby unit plus the active duty trainers and other personnel in the training squadron. Upon arrival in the combat theater these packages could be used to reconstitute existing units. Using package replacements in this way would allow a Service to make optimum use of the people and aircraft in the training base as well as to take advantage of the combat experience gained by the remaining members of the existing unit.

B. OPTIONS FOR RESTRUCTURING THE ARMY

This section outlines a set of options for restructuring the Army, Army Reserve, and Army National Guard.

1. Adopt UCM Policies

The Army could adopt the full range of UCM policies discussed in Chapter I and in greater detail in Chapter III. They could be adopted by both the active and reserve components. These policies will allow the Army to make better use of its Total Force assets and to increase the effectiveness of it units.

2. Maintain Overseas Capability with Fewer Troops

The Army currently has five 2/3 Division equivalents stationed in Germany. Political changes in Europe have both created pressures to reduce the number of American troops stationed there and created opportunities to do so without necessarily reducing American combat power. We believe overseas strength can be cut with minimal reductions in the number of fully trained divisions that can be mobilized and ready for action within the longer warning times now expected.

Several categories of U.S. logistical units can be removed and replaced by increased reliance on German civilian assets, the German Territorial Army (TA), and the U.S. reserve component. Doing so should prove easier than in the past because the unification process will increase the availability of labor and other resources, and because U.S. forces' new role as operational reserves should change the demands imposed on U.S.

support units. Taken together, the changes could reduce U.S. personnel strength in Europe by more than 36,000.

In addition, changed military circumstances and arms control agreements in Europe make it possible, or in some cases necessary, to remove air defense, nuclear artillery, and European Command headquarters personnel. Multiple Launcher Rocket System units can be strengthened to substitute for 8-inch artillery battalions, for a net reduction in personnel overseas. Finally, some U.S. helicopters should be removed from Europe to permit NATO to meet ceilings in the Conventional Forces in Europe Treaty and still have the helicopters available in an emergency. Taken together, these changes would permit the U.S. to cut its European troop strength by more than 10,000 soldiers.

3. Use Ready-Standby Organization To Reduce Overseas Manpower

The initiatives discussed above would permit the Army to keep five 2/3 Division equivalents in Europe even if budgets were cut and politics required the Army to bring 80,000 soldiers home. Budgetary and political pressures might force further reductions in overseas strength. If so, the Army would not necessarily have to reduce the number of divisions stationed in Europe. As illustrated in Chapter III, the Army can keep the flags and equipment for five 2/3 Divisions in Europe with only about 70,000 soldiers deployed there in peacetime. It could accomplish this objective by adopting RSO for its remaining units, assigning mostly Standby status units to European duty, and rotating Ready units *as units* between the Continental United States (CONUS) and Europe.

4. Reconfigure the Army National Guard and Army Reserve

Several considerations argue for reconfiguring the Army National Guard. First, the Guard has both a peacetime mission in the 50 states and a wartime mission overseas. It can and should be organized into units that would prove helpful in both roles. This means configuring Guard units to contribute to both roles either as infantry or as support units (e.g., signal, trucking, military police, maintenance). Second, both Army and NATO doctrinal changes and the operational reserve role for U.S. units stationed in the western portion of a unified Germany imply that the regular Army and Guard need not have combat units of similar design. In particular, the Guard's wartime utility and strategic mobility would be greatly increased if its straight leg infantry units were converted to motorized infantry rather than heavy armor or mechanized configuration. Third, increased warning time and tighter budgets make it more attractive than ever to rely on the Guard; its units take longer to mobilize than do regular Army units, but are relatively cheap.

Several kinds of military units perform technical functions similar to those performed by civilians. Additional responsibility for such functions can be shifted from the active Army to the Guard and Reserve. The kinds of units affected would include engineers, military police, and maintenance and medical personnel.

In addition, the high quality and readiness (and relatively lower cost) of Air National Guard units suggests that many highly technical active Army units like aviation (and even electronic warfare and intelligence at the corps and echelons above Corps level) might usefully be transferred to the Guard and Reserves.

C. OPTIONS FOR RESTRUCTURING THE NAVY

If the Navy's budget for active duty manning were cut, it would not have to change its current manpower practices; it could continue them, albeit on a smaller scale, with a smaller fleet. Alternatively, it could alter those practices along the lines proposed in this section and preserve a relatively larger fleet. The former choice would imply a small fleet (relative to today's fleet) that the U.S. could deploy relatively quickly; the latter choice would imply a fleet that would be closer in size to today's fleet and that would take longer to deploy. Assuming that the Navy preferred the larger fleet, its options would be as follows.

1. Adopt a Modified Ready-Standby Organization

The Navy can adapt the Ready-Standby concept to its ships and air wings. That is, it can assign a complement of full-time personnel to ships and air units in "Ready" status and a mix of full-time, part-time, Extended Leave/Individual Ready Reserve (EL/IRR), and retired personnel to ships and air units in "Standby" status.

a. Application to Ships

The Ready-Standby concept has to be be modified when applied to ships for two reasons. First, ships require frequent maintenance by skilled people if they are to be available for use on short notice. Second, to keep ships in its force despite funding cuts for active duty manning, the Navy has to provide a work environment similar to shore duty for the crews of many of its ships.

RSO in the Navy would require ships to spend one year in Ready status followed by one year in Standby status, and so on; overhauls and other major maintenance activities would be performed while the ship was in Standby status. Ships in Standby status would have what we term a "Cadre" crew of roughly 30 percent normal size, comprised primarily

of career sailors. Except for perhaps one 8-hour period at sea each quarter, these ships would remain in port for the year in Standby status. Thus, the cadre crews would enjoy a work life similar to shore duty, which should help to induce them to remain in the Navy. Ships in Ready status would augment the 30 percent cadre crew with a 70 percent "cruise crew" and would go through a standard workup and deployment cycle while in that status.

This pattern would require changes in the assignment of first-term sailors. In brief, we envision that newly trained first-term sailors would serve back-to-back tours as members of the cruise crews of different Ready ships. (Thus, many sailors in the cruise crew of a ship that just entered Standby status could join the cruise crew of another ship that just entered Ready status. For this reason, not all of the members of a ship's crew in Standby status would have just finished serving a year together as members of its Ready crew.)

In the event of mobilization, a Standby ship's Cadre crew would require 70 percent augmentation--by a set of sailors we term its "mobilization crew"--before it could deploy. The members of the mobilization crew would carry hip-pocket orders assigning them to the ship; the ship's Commanding Officer would know who they were, as well. To the extent possible, a ship's mobilization crew would include members of recent cruise crews (i.e., personnel who had served aboard that ship during a recent "Ready" phase). In addition, the Navy could assign personnel to the mobilization crew from the following sources: (1) sailors that had left the ship for shore establishment billets (e.g., Service schools) and other full-time personnel, some of whom would be freed for duty by having recalled retirees fill their billets; (2) other members of the Individual Ready Reserve who were not recent members of that ship's cruise crew but who had sailed on a sister ship or on that ship at a previous time; (3) retirees that recently left active service; and (4) members of Selected Reserve augmentation units such as exist today for many units.

b. Application to Carrier Air Wings

The Navy could assign Ready carrier air wings manned entirely by full-time personnel to each carrier in Ready status and assign two Selected Reserve wings and a number of Standby wings to each of its carriers in Standby status. The Reserve wings would comprise a mix of full-time and part-time personnel, as they do today. Standby wings would comprise full-time individuals assigned to the wings in peacetime and double-hatted non-operational personnel (e.g., the pilot in a Pentagon desk job), part-time personnel (e.g., Selected Reserve augmentees), and recently retired or EL/IRR personnel.

2. Configure Readiness Air Groups for Deployment

The Navy can configure the 200 aircraft in its Readiness Air Groups (RAGs) into carrier wings for temporary deployment in the event of all-out war. The rationale for doing so is described in Chapter I. Of course, RAG units would likely be the last first-line pilots and aircraft to deploy, since they would initially be used to prepare other pilots--via intensive refresher training, for instance--to fight.

D. OPTIONS FOR RESTRUCTURING THE AIR FORCE

This section outlines three options for restructuring the total Air Force, which includes today's Active Air Force, the Air Force Reserves, and the Air National Guard. We assume here that, within the limits of budget constraints, the Air Force will want to reserve its force structure and current capability. The following restructuring would permit it to do so.

1. Implement Ready-Standby Organization in the Air Force

The Regular Air Force could create Standby units manned by fully trained personnel on a part-time basis. Personnel assigned to a Standby unit could include the following: (a) full-time personnel holding non-operational jobs elsewhere in the Air Force (e.g., the pilot holding down a desk job in the Pentagon), (b) newly retired personnel who recently served in comparable operational jobs (and who would be assigned to Standby units alongside people with whom they had served on active duty), (c) Air Force personnel on extended leave during their first year after active service, (d) members of the Individual Ready Reserve, and, (e) in some cases, Selected Reservists. These personnel would be assigned to Standby units when they left operational units; all would conduct refresher training with their Standby unit.

Each Standby unit would be associated with a "Ready" unit manned by full-time personnel in the Regular Air Force. An individual who had just completed a Ready tour with the associated Ready unit would seem part of his wing's Standby unit until his next Ready assignment. The Commanding Officer of the parent Ready unit would command the Standby unit; he would maintain contact with his Standby personnel and involve them in the life of the unit to the extent that his resources allowed.

2. Transfer Aircraft to Air National Guard and Air Force Reserve Units

One way to maximize the number of fully trained and readily mobilizable Air Force units involves the transfer of aircraft to the Air Force Reserve and Air National Guard. For

example, the Air Force could assign Guard and Reserve squadrons enough aircraft (112) to bring them up to 24 aircraft apiece. In addition, it could create new Guard and Reserve units.

3. Organize Tactical Fighter Training Wings for Combat Deployment

The Air Force also could configure about 300 of its aircraft in Tactical Fighter Training Wings (TFTWs) for overseas combat missions. Chapter I outlined the rationale for doing so. This step would increase the number of the Air Force units by over four additional tactical fighter wings.

Chapter I's rationale envisions an all-out war in which the U.S. loses aircraft quickly and needs to be able to send more into the fight before the industrial base has increased output for that purpose. For lesser wars, the Air Force would continue to use TFTWs only for training.

TFTWs could be reorganized as "Standby TFTW" units and counted as combat units. In peacetime and during some less-intense wars, Standby TFTW units would have the same complement that they have today. However, once mobilized, these units would be augmented by personnel from the same mix that would constitute other Standby units. Alternatively, the aircraft and personnel in TFTW could be used in "packages" to strengthen units that had suffered serious losses.

E. OPTIONS FOR RESTRUCTURING THE MARINE CORPS

This section describes several ways in which the Marine Corps could reorganize to preserve force structure despite lower budgets. Moreover, Marine Units would become more proficient and cohesive as a result of these recommendations.

1. Implement Ready-Standby Organization in Marine Ground Units

Ready-Standby Organization can be implemented in the Marine Corps in a way that accommodates the Marines' mission and deployment requirements. In most respects, the pattern we envision conforms to the general description of RSO provided in Chapter I, Section C.

a. Ready-Training Status

Upon entering boot camp, recruits would be assigned to a particular Marine unit (e.g., 3rd Battalion, 9th Marines). They would train together in the company of NCOs and

Staff NCOs who had also been assigned to 3/9 and who themselves had previously served together as members of the 9th Marines. After 6 months' initial training, these Marines would join the rest of 3/9 and begin pre-deployment ("lock-on") training. For this 6-month period, 3/9 would be in a status for which we've coined the term "Ready-Training."

b. Ready Status

After lock-on training, 3/9 would leave "Ready-Training" status and enter the "Ready" status for 2 or 3 years. While in this status, the unit would participate in a unit deployment cycle comparable to that of active duty Marine units under the Current System.

c. Standby 1 Status

Following the completion of the Ready Status, 3/9 would begin a year in Standby 1 status. At that point, some Marines would retire, some would enter EL/IRR status, and some would join the Selected Marine Corps Reserve. Marines who continued active duty when their unit entered Standby 1 status would be assigned to various "non-operational" jobs. Regardless of their choice, all of these Marines would know that they were still members of 3/9 and would have hip-pocket orders to re-join 3/9 in the event of mobilization.

d. Standby 2 Status

In the fifth through eighth years of a notional eight-year obligation, Marines who had been assigned to Standby 1 units but not to a newly forming Ready unit would be assigned to Standby 2 units. Active-duty Marines would remain in this status until they returned to service in a Ready unit. Marines in the IRR would be subject to recall to this unit for as long as their service obligations lasted. Retirees also would be subject to recall to this unit for the first few years after they left active service. (After that time, they still would be subject to recall, but might be used in other roles discussed below.)

e. Call-Up Units

Marine NCOs and officers who have left active service and who have completed their service in Standby status could be formed into what we term "Call-Up" units. Upon mobilization, Call-Up units would be filled with recruits and would begin training as a unit.

2. Implement Ready-Standby Organization in Marine Air Units

Ready-Standby Organization can also be implemented in Marine Air units. Ready units would be manned 100 percent with full-time Marines, as active-duty units are today.

The Marine Corps could respond to budget cuts without reducing the number of fully trained and readily mobilizable Marine air units by creating "Standby" units. Fully trained Marines would man Standby units, but not on a full-time basis. Instead, the peacetime complement of Standby units would include a small number of full-time personnel and a mix of others from the same sources that contribute to Standby units in the other Services.

Each Standby unit would be associated with a "Ready" unit manned by full-time Marines. For example, if the Corps were to choose to cope with reduced operating budgets by creating a three-to-one Ready/Standby mix, it could assign four squadrons of aircraft to each Group. The Group CO would be responsible for *all* of the Marines assigned to his group, not just those assigned to full-time jobs in peacetime. The full-time Marines assigned to the wing would fly and maintain all of the aircraft in it by cycling through the aircraft assigned to each of the four squadrons.

3. Configure Aviation Training Squadrons for Combat Deployment

Standby-Training squadrons would, in peacetime, have the same makeup as do Marine training squadrons today. In an emergency, however, Standby-Training squadrons could be augmented with active-duty Marines holding non-operational jobs, Marine pilots who have left full-time active duty but continued to fly on a part-time basis to maintain proficiency, and EL/IRR/retired Marine pilots who have recently left service with an active squadron. The rationale for creating Standby-Training squadrons in the Marines is exactly analogous to the rationale for doing so in the other Services.

III. OPTIONS FOR THE ARMY

This chapter describes how the ideas outlined in Chapter I could be applied to the "Total Army," which includes the Regular Army, the Army Reserve (USAR), and the Army National Guard (ARNG). First, we provide additional detail about applying Unit Cohesion Model (UCM) policies and compare Ready-Standby Organization (RSO) with the Current System. Next, we describe how the United States could maintain its overseas capabilities with fewer troops. Then, in keeping with our tasking to identify desirable ways to use the full range of manpower assets available to DoD, we describe how the Army could increase the capabilities of the Guard and Reserve. Finally, we discuss the cost implications of implementing these changes.

A. ARMY APPLICATION OF UCM POLICIES

This section details the differences between the UCM and the Current System and describes measures by which the Army could apply the UCM policies described in Chapter I. It shows how the RSO would permit the Army to quickly mobilize the same number of fully trained units that it could under the Current System despite having fewer full-time personnel in those units.

1. Ready-Standby Organization

Figure III-1 contrasts the pattern of service that would characterize Army combat units under the combat-unit variant of RSO with that which obtains for non-COHORT units under the current manpower system. For convenience, we describe the Current System first.

a. The Current System

The top part of Figure III-1 depicts the relationship between individuals and units to which they're assigned under the Current System. The unit gains newly trained people from basic training organizations and more senior and highly skilled individuals from elsewhere in the Service. It also loses people as individuals reach the end of their active service, get promoted out of their current job, transfer to units overseas, or depart for myriad other reasons.

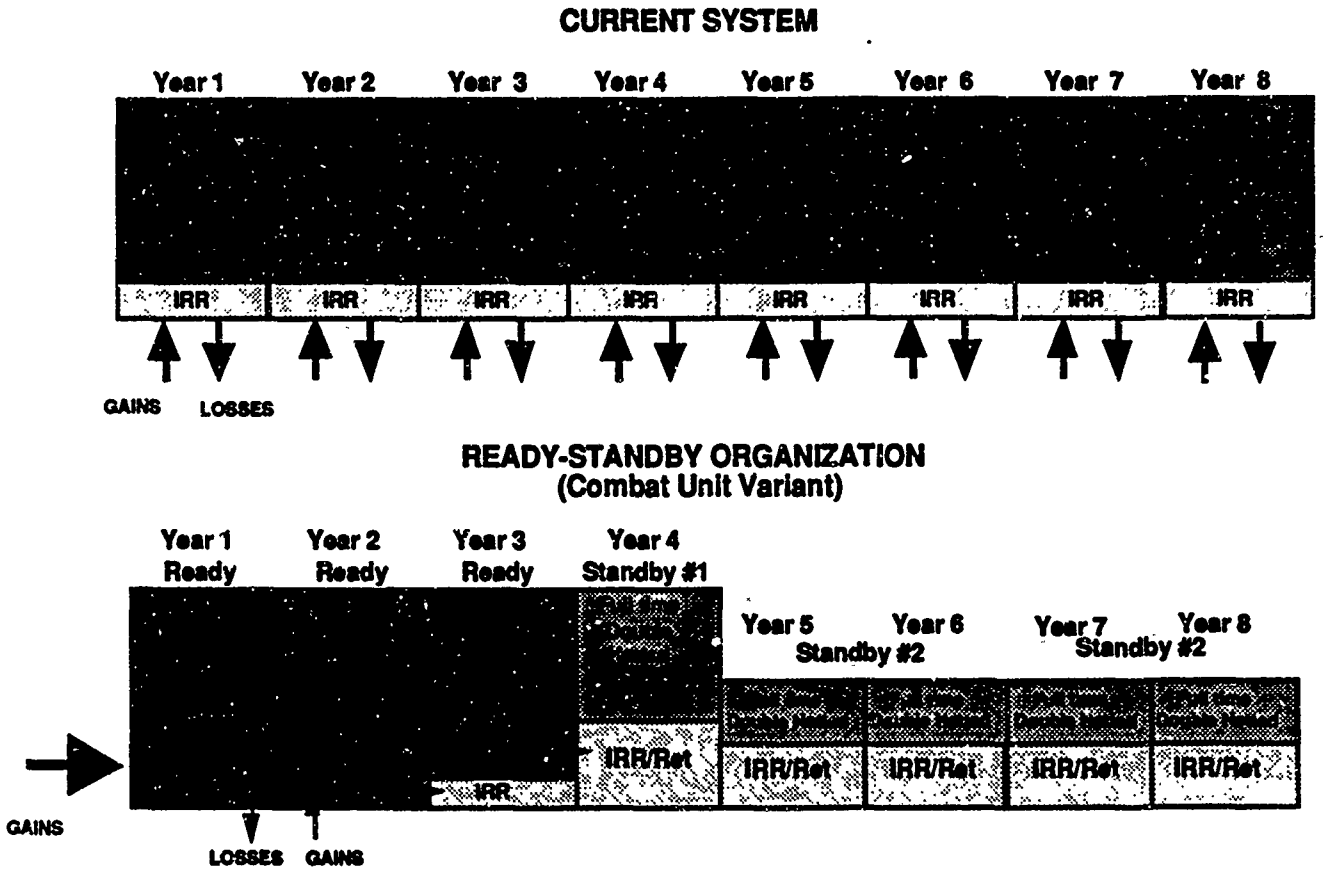


Figure III-1. Two Ways To Man a Combat Unit

Owing to the high personnel turnover, this unit never develops the proficiency that would characterize units that could train together for years. Instead, it gets about 9 to 12 months along in training, and then has to start over again because so many of its people were not in the unit during the earlier training phase. For the same reason, the unit never develops the kind of cohesion that would characterize groups of people that had served together for years. Thus, the unit's proficiency and cohesion in one year fluctuates but never gets much better than the best it was in the previous year. This happens in both combat and support units.

The unit's leadership is powerless to change this situation. They, too, are with the unit for only a short period, and they have little control over the flow of people in and out of their unit; personnel assignments are managed centrally in each of the Services. (For a quantitative assessment of the prospects for building unit cohesion in the Current System, see the discussion of Familiarity Indices in Appendix B.)

b. Implementing Ready-Standby Organization

The bottom part of Figure III-1 depicts one example of the UCM alternative: the pattern of service that would characterize Army combat units under Ready-Standby Organization. As noted in Chapter I, the unit would move through a multi-year cycle. At all times apart from the beginning of that cycle, the unit would embody a higher state of proficiency and cohesion than it would under the Current System. This increase in proficiency would result from reduced personnel turbulence and the fact that members of a unit would serve together for extended periods.

If the Army were to adopt the RSO, it could preserve readily mobilizable, fully trained units despite significant budget cuts. Adoption of RSO would permit the Army to quickly mobilize the same number of combat units that it can mobilize under the Current System with as many as 50 percent fewer active duty people assigned to those units. The bottom part of Figure III-1 illustrates this point if we interpret the rectangles depicting years 1 through 8 as a snapshot of six units at a single point in time. In the event of mobilization, four units would be readily available: the three Ready units and the Standby 1 unit. Because of the high levels of cohesion and expertise created during the Ready period, the Standby 1 unit ought to be able to restore its combat effectiveness fairly quickly in an emergency. Standby 2 units would be less readily available but would still represent a significant capability given the high levels of training and cohesion they had reached while in Ready status.

Two points are worth noting concerning unit equipment under RSO. First, the number of equipment sets available would set an upper bound on the number of Ready and Standby units the Army could create. Since the Army bought the equipment for a large force over the last several years, this constraint is unlikely to limit the force structure that the Army can create with a reduced budget. Second, the Army can associate units with equipment in various ways. When a unit left Ready status, it could store its equipment and plan to fall back in on that equipment if it were to be mobilized anytime during its year in Standby status. Alternatively, the unit might be assigned a different but identical equipment set for mobilization purposes. For example, a unit that went through Ready status in the Continental United States (CONUS) might be assigned a POMCUS set in Europe or a maritime-prepositioned equipment set while in Standby status.

The Army could apply RSO to Combat Service Support (CSS) forces, as depicted in Figure I-4 in Chapter I. It could reduce the manning of active component CSS units to

the level needed to support peacetime operations and training levels. At the same time the Army could assign personnel who had left a given unit to Standby status in that unit. These Standby personnel would return to the unit in an emergency in order to increase unit manning to the level necessary to meet mobilization or combat activity levels.

2. Cohesive Unit Policies

a. IRR Recall

Adopting unit-affiliated IRR recall would also require changes in how we manage the IRR. Note, however, that this measure could strengthen the Army in an emergency even if the individual replacement system stayed in effect for full-time active duty personnel, and even if the Army did not adopt RSO.

Today the Army plans to assign soldiers to units without regard for their previous unit affiliation. If, instead, the Army adopted unit-affiliated recall, EL/IRR soldiers would maintain their affiliation with their previous units and their units would maintain contact with them and arrange for their training. Thus, the responsibility of the central Army Headquarters might be to manage IRR members not assigned to a combat unit, to establish overall policy, and to manage EL/IRR personnel and financial records.

The National Guard could also take advantage of this new way of using members of the EL/IRR and retiree population. Today, for example, when a soldier who has not exhausted his Military Service Obligation (MSO) leaves active service in the National Guard, that soldier is transferred to the IRR, which is a component of the Army Reserve; he is lost to the Guard. Upon mobilization, he would be used as an individual replacement, most likely in an active component unit. Similarly, a National Guard retiree is lost to the Guard and, upon mobilization, would not be available to meet continuing Guard needs such as support of the State mission. By adopting unit-affiliated recall, the National Guard would retain access to these individuals in an emergency. Guard members of the IRR population might be kept in a special state-oriented category that would allow each state to offer them peacetime training opportunities and, in a crisis, to return them to their previous units or to use them to meet other National Guard needs.

b. Retiree Recall

Adopting cohesive unit policies and RSO would require changes in how we manage retired soldiers.

The Army has improved its planning for the post-mobilization use of retirees. It has developed a system for assigning retirees to mobilization billets and has even decided that retirees can be used overseas. However, the Army has not planned on returning retirees to their previous unit, or on systematically using retirees to replace active-duty soldiers leaving non-operational jobs to rejoin units in Standby status. Both measures would be required to maximize unit cohesion and implement RSO. Again, however, these changes could strengthen the Army in an emergency even if the Army chose to retain its individual replacement system, and decided against RSO.

c. Personalized Personnel Management

The Army could increase unit cohesion by adopting measures that would permit managing individual soldiers' careers on a more personalized and less centralized basis. Following are four examples of such measures.

Home Basing Soldiers. The Army has adopted a Regimental system for a large portion of its mission forces. The Army could enhance and expand this program to provide soldiers greater assurance that they would spend the majority of their career in a "home base." This would allow soldiers and their families to establish strong ties to their units as well as to a local community.

Decentralized Assignment. The Army could delegate authority to local commanders for making assignments to units within their commands. These local commanders will know their troops as individuals rather than as anonymous soldiers with only a grade and a skill. This authority could be particularly important as local commanders organize new Ready units and as they attempt to ensure that they have the best Standby 2 units possible. This practice would also help ensure that the very best people were in the mission force.

Decentralized Promotion. Instead of making promotion decisions for staff noncommissioned officers (NCOs) and company-grade officers centrally for the entire Army, the Army might delegate this authority to the level of the division commander. This change would permit these decisions to be made by people who have both first-hand knowledge of the individual involved and the greatest stake in the division's performance and success.

Decentralized Recruiting. The Army might choose to give division commanders the authority to choose NCOs for recruiting duty, and permit recruiters--though under the authority of the recruiting command--to recruit for their parent division. Such a system would permit division commanders to reap the benefits from putting first-rate NCOs on recruiting duty. Since recruiters would know that they were going to return to their parent division, they would be motivated to select people with whom they would want to serve. Finally, this system should help new recruits feel a sense of identity with the unit they were to join.

3. Inactive Service Reform

Adopting the mandatory inactive service extension would permit the Army to get a wartime return on a group of highly trained soldiers that the Current System does not use well and risks wasting altogether in the course of upcoming force cutbacks--the trained people who leave the Army after the end of their 8-year service obligation but before retirement. It is not critical to retain, beyond their 8-year military service obligation, Individual Ready Reserve (IRR) soldiers who may have spent 3 or 4 years on active duty. But it may prove vital to be able to recall to service the relatively young officers and NCOs who spend as many as 8 to 10 years on active duty and who cannot be recalled if they leave active service under the Current System. These people can provide leadership in Standby and Call-Up units that cannot be provided any other way. The alternative is to "grow" another generation of junior leaders in the ranks, a process requiring both time and money that may not be available.

Adopting the Extended Leave proposal would further enhance the Army's ability to make use of the best trained members of the IRR--the soldiers who have left active duty within the last year. This proposal will allow the Army to make confident use of these people either in Standby 1 units, if they adopt the RSO, or in other ways such as in the RT-12 program the Army has been trying to develop for several years.

4. Alternate Patterns of Selected Reserve Service

Major elements of the UCM policies can be incorporated in the Army Reserve and the ARNG. Both USAR and ARNG units can augment active component Ready and Standby units. Both USAR and ARNG units can be configured as separate Ready and Standby units ("Ready" USAR and ARNG units would have the same blend of full-time and part-time personnel that all USAR and ARNG units now have.) Alternatively, USAR and ARNG units might be configured as composite Ready-Standby units along the lines of the RSO Support Unit Variant discussed in Chapter I. Selected Reserve units in Standby status could adopt such Cohesive Unit Policies as the assignment of retirees and members of the IRR to their former units. Finally, Selected Reserve units could adopt Inactive Service Reform by incorporating an IRR extension into the standard reenlistment contract.

section and describe how the UCM's RSO idea might be used to maintain readily mobilizable troop strength overseas.

1. Maintaining Overseas Capability With Fewer Troops

The Army currently has five 2/3 division equivalents stationed in Germany. Political changes in Europe have both created pressures for reductions in American troops stationed there and created opportunities to do so without necessarily reducing the amount of American combat power available in a crisis.

Table III-1 shows how overseas strength can be cut with minimal reductions in the number of fully trained divisions that can be mobilized and ready for action within the longer warning times now expected. We provide a brief discussion of these measures below; Appendices D and E provide more detail.

a. Find Substitutes for Active-Duty U.S. Logistic Units

Several categories of U.S. Logistic units can be removed and replaced by reliance on the German Territorial Army (TA) and the U.S. Reserve component. Taken together, the changes depicted in Table III-1 could reduce U.S. personnel strength in Europe by more than 36,000.

The Army could plan to rely on mobilized civil assets under command of the German TA to construct and maintain lines of communication. Doing so should permit the U.S. to eliminate 9,000 overseas billets in engineer battalions and bridging companies above the division level.

Germany is awash in trucks of all shapes and sizes which can be maintained in local repair shops. The Army could plan to use these assets in an emergency and to change its transportation pattern from customer pick-up to a more efficient provider-delivery system. These measures should permit the Army to eliminate 3,500 overseas billets in transportation companies above the division level.

Table III-1. Ways To Reduce Overseas Troop Strength

Prescriptions	Personnel and Unit Types Affected	Possible Reductions in Full-Time Personnel Overseas
Find Substitutes for Active-Duty Support Units	Engineers	9,000
	Transportation	3,500
	Maintenance	11,000
	Military Police	1,200
	Food Service	2,500
	Signals	3,000
Remove Units Whose Significance Has Diminished	Air Defense	12,000
	Tactical Nuclear Weapons	15,000
	EUCOM Headquarters	1,000
Respond to technological change and arms control contraints	8-inch Artillery Battalions	5,000 (net) *
	Attack Helicopters	5,500

* Eleven 8-inch battalions are currently in Europe, requiring 6,400 troops; the Army could replace them with 3 MLRS battalions (1,400 troops) for a net reduction of 5,000 troops.

Recent developments make it possible to return to use of the Labor Service (LS) units (composed of German nationals) and Civilian Labor Group (CLG) units (composed of East European refugees) once common in the U.S. Army in Europe (USAREUR). The Army could do so for the performance of maintenance functions at the level of corps and echelons above corps.

One-third of the Military Police (MP) billets in combat support companies at corps level and above perform activities like road control and rear area security. These tasks are better performed by German units; the Army could eliminate 1,200 billets in MP combat support companies and shift their responsibilities to integrated USAREUR/TA units.

Currently, 3 to 4 percent of USAREUR personnel are assigned to food service billets. These percentages exceed in-garrison requirements; for field messes, the Army could rely on German TA support and on canned rations.

Signals organizations serving the Army's major European commands currently account for some 16,000 billets. In addition, field army units have their own communications sections. This pattern of organization and the number of troops associated with it have remained remarkably stable for decades. In light of the revolutionary changes sweeping the telecommunications industry and the Army's new role as an operational reserve, and in anticipation of troop ceiling reductions in Europe, we propose that the Army shift five area signal battalions to the TA, for a savings of 3,000 billets.

b. Take Advantage of Changed Military Circumstances To Remove Certain Categories of Units

The impending relocation of Soviet forces in Europe, and the prospect that German forces will provide some kind of air defense for the Eastern Lander, imply that air defense is a less critical mission for the U.S. Army in Europe. In light of this, the Army could allow German reserve forces to assume the responsibility for manning the HAWK/Patriot belt and, indeed, the entire ground-based air defense mission. Such changes would both eliminate 12,000 billets in Germany and obviate the need for indirect support and a rotation base maintained almost exclusively in support of the European mission.

The Army currently requires some 16,000 billets in Europe to perform its theater nuclear mission. If theater nuclear weapons are removed, these people can also be removed.

Some 1,000 billets are associated with EUCOM headquarters. This organization can be eliminated as the number of peacetime troops and dependents is reduced.

c. Restructure Artillery and Helicopter Organizations

The Army could remove 11 8-inch artillery battalions from Europe (6,400 troops) and replace them with three MLRS battalions (1,400 billets), for a net reduction of 5,000 soldiers in Europe. This change would enhance Army units' ability to perform their role as operational reserve.

The proposed ceiling of 1,900 assault and attack helicopters--alliance-wide--will require a significant reduction in NATO helicopters. The Army could remove 500 helicopters from Europe to permit NATO to meet the Conventional Forces in Europe (CFE) 1 Treaty ceiling, and could remove an additional 200 for CFE 2. Removing these helicopters to CONUS is preferable to losing them altogether; moreover, it would eliminate 5,500 billets from U.S. Army forces in Europe.

d. Station a Mix of Ready and Standby Units in Europe

The initiatives discussed above would permit the United States to keep five 2/3 Division equivalents in Europe despite budget cuts and a possible political mandate to bring 80,000 soldiers home. Budgetary and political pressures may force further reductions in overseas strength. In that event, it seems unlikely that funds would be made available to create the facilities needed to station more units in the United States. In such a situation, the Army would have two alternatives. It could maintain the current manpower system and disband some of the divisions stationed overseas, or it could adopt the RSO (and a unit rotation system) and thereby keep the equipment for five 2/3 Divisions in Europe with only about 70,000 soldiers deployed there in peacetime.

Some changes would be required to adopt RSO and a unit rotation system. Table III-2 illustrates what would be involved in doing so for the Army's 47 tank battalions. Given 24 battalions in CONUS and 23 in Europe, the Army could reconfigure them to produce roughly a 50-50 Ready-Standby split (i.e., 24 battalions in Ready status and 23 in Standby status). It could station two-thirds of the Ready units (i.e., 16 battalions) in CONUS, and one-third overseas (for 8 in Europe). Each battalion would spend a total of 2 years in CONUS and 1 year overseas while in Ready status and would remain assigned to Europe for a year in Standby 1 status and an additional year in Standby 2 status.

Figures III-2 and III-3 depict an application of the Ready-Standby concept in which there would be a 50-50 split between Ready units and units in Standby or Call-Up

status. This split is entirely illustrative. If its budgets permitted, the Army could instead apply the Ready-Standby concept and configure itself with two-thirds or three-fourths of its units in Ready status.

Table III-2. Manning and Deployment of Army Tank Battalions: RSO vs. Current System

Unit Manning Pattern	Army Tank Battalions	
	CONUS	Europe
Current System (90-100% Full Time Personnel)	22	25
Ready-Standby Organization		
Ready	16	8
Standby #1	0	8
Standby #2	8	7
TOTAL	24	23

Figure III-2 illustrates how a division might be organized in Europe. Following the principles just discussed, each division might have one brigade in Ready status, one in a Standby 1 status, and one in a Standby 2 status. Other units in the division would be configured similarly. The division commander would be present in Europe; both he and the Standby brigades would have a skeleton staff there full-time.

Unit rotation would replace individual rotation between CONUS and Europe, and strong measures would have to be taken to reduce the number of dependents overseas. For example, the Army might experiment with (a) moving units to Europe for two 6-month tours (instead of one year-long tour) while those units were in Ready status and (b) returning the unit to the CONUS base from which it came, to discourage the families from wanting to move to Europe. Similarly, the Army might experiment with unit-wide home leave half-way through overseas deployments. Doing so might both ameliorate the morale effects of long separations and help develop cohesion.

Figure III-3 illustrates how a division might be organized in CONUS. A CONUS division might have two Ready brigades and one Standby or Call Up brigade. For a non-European contingency, the division could deploy with two-thirds strength. Alternatively,

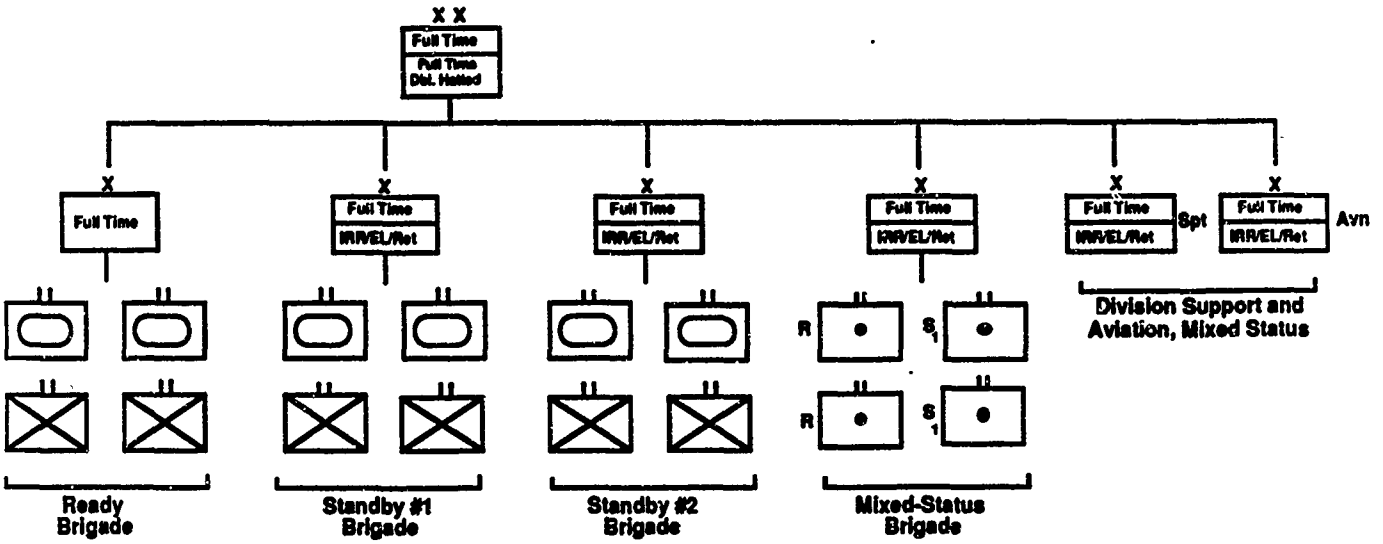


Figure III-2. Application of the RSO to a Division Based in Europe

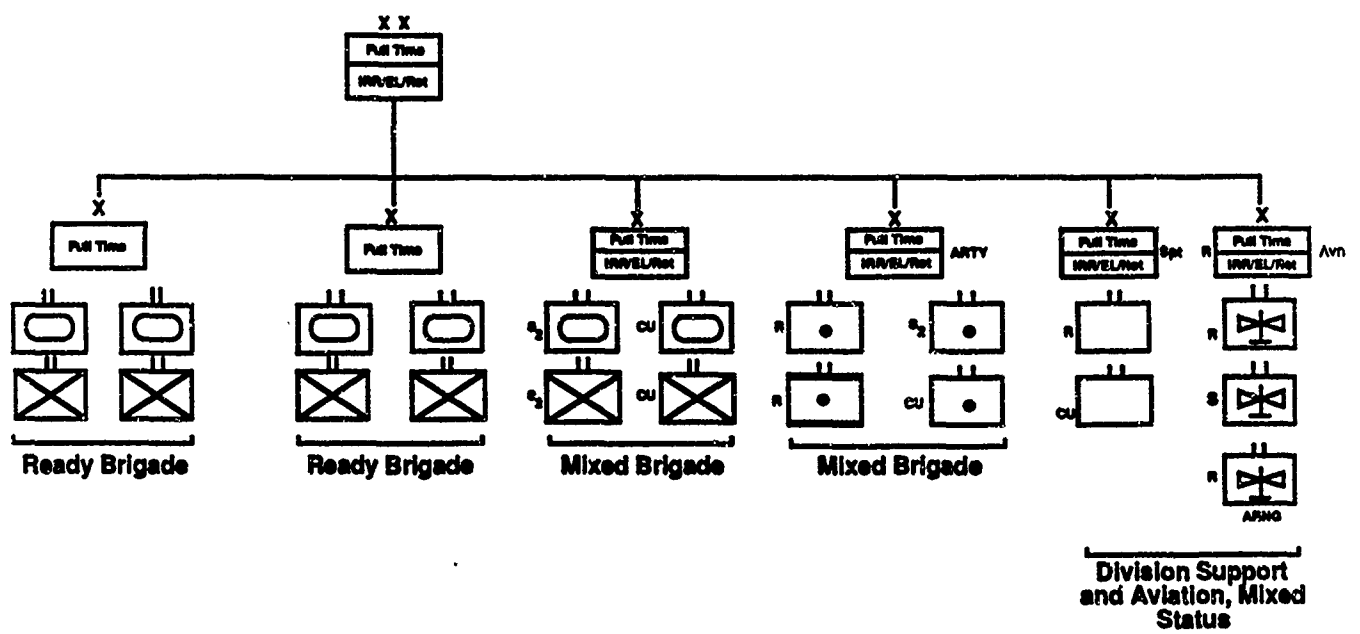


Figure III-3. Application of RSO to a Division Based in the U.S.

it could mobilize its Standby 1 brigade and have it fall in on its CONUS equipment. In a European contingency, the Ready and Standby CONUS forces could deploy to POMCUS equipment.

2. Reconfiguring the Army National Guard and Army Reserve

The Army National Guard (ARNG) and Army Reserve perform important peacetime and wartime functions. The Army could reconfigure each in ways that would enhance the contribution they make.

a. Convert ARNG Leg Infantry Units to Motorized Infantry

With the change in the global security situation has come a call for greater reliance on the reserve component and for making the infantry portions of the ARNG more capable of contributing to a future war in Europe or elsewhere. The large number of European infantry forces and the prospect that U.S. forces will be employed in missions that require high tactical mobility have led to calls for converting the light infantry forces of the ARNG to heavy armor and mechanized forces. This would be a difficult and expensive conversion. Given a decision to invest in Guard units to make them better able to contribute in a future war, the Army should consider converting ARNG leg infantry. Several points are worth noting in thinking about such a conversion.

First, the ARNG has both a peacetime state mission and a wartime federal mission; it is misleading to think of the first role as a lesser included case of the second. The state mission requires trained units to enforce martial law and support units to help in natural catastrophes. Infantry units are useful for the first role, but tanks, artillery, and the armored personnel carriers of mechanized units are not. Occupational specialties that are useful in the state role include signal, trucking, maintenance, engineering, military police, and medical specialties represented by half of the U.S. Army's personnel strength in Europe today.

Second, doctrinal innovation in the U.S. Army and in NATO has changed the kind of combat units needed in a European scenario. The new doctrine envisions not linear but maneuver warfare and a fluid battle fought along "thrust lines" in the defense and offense. For such a battle, the Army does not need units of similar design appropriate for old-style linear warfare, in which a line was no stronger than the weakest unit in it. Instead, the Army needs two kinds of units: (1) "thrust line" units (including heavy armor and mechanized units, long-range artillery, and highly trained air assault infantry), which do the heavy fighting and demand the most highly trained troops; and (2) motorized

infantry, which complements the thrust-line strike forces. Motorized infantry can fill the gaps between the "thrust lines" and can also serve as the follow-on force for consolidating the space gained by heavy maneuver forces. In a European war, the Army would require more motorized infantry units than heavy units since the former is more suitable for the close terrain that comprises half of Germany.

Third, political developments have led to expectations of increased warning time of a Soviet attack; this, too, argues for a continued role for the Guard. In the past, one could argue that scarce resources should be devoted to more costly active units instead of less costly Guard ones, on grounds that the latter took so long to mobilize. Now, with the prospect of greatly increased warning time, additional reliance on the ARNG warrants consideration.

Fourth, the costs and required quantity of heavy units (i.e., armor and mechanized infantry), on one hand, and of motorized infantry, on the other, suggest the prospect of a division of labor between the active Army and the National Guard. Armored units are costly to maintain and train and it is hard to secure the ranges needed to do so. Moreover, it is unreasonable to expect part-time Guard units to meet standards that are difficult for active Army units to achieve. Equipment for motorized units is readily available, relatively cheap, and easier to maintain and train with at existing reserve facilities. Finally, both heavy and motorized units have vital missions to perform in wartime, but the motorized infantry role demands more troops.

The Guard today has six infantry and four heavy divisions; nine separate infantry, four mechanized infantry, and six armore/cavalry brigades; and seven mostly mechanized brigades detailed to rounding out the active army. In light of the considerations described above, the Guard might better perform both its state and federal missions if some of its leg infantry units were converted to motorized infantry.

Guard motorized divisions could be manned at about 10,000 men, which is smaller than the 16,000 complement of Guard divisions as currently configured. By converting some of its units to motorized infantry (specifically, 6 infantry divisions, 9 infantry brigades, 4 mechanized brigades, and 7 roundout brigades), the Guard could free up 62,000 Guardsmen for other roles. These roles could include more motorized infantry units, or units of other kinds.

This discussion has focused on the European mission since that is one in which the Guard role has long been planned. Configured as motorized infantry, however, the

Guard would have both strategic and tactical mobility that would be well suited for other missions.

b. Specialized Roles for the Guard and Reserve

Many kinds of military units perform technical functions similar to those performed by civilians. Although the reserve component already has many responsibilities in this area, more missions and functions could be shifted from the active Army to the Guard and Reserve. The kinds of units affected could include engineers, military police, maintenance, and medical. These technical combat service support missions have traditionally been given to the Army Reserve. Should some of these missions be given to the ARNG, there exist a number of possible ways to make better use of state and local resources. For example, a state or local highway department might support an engineer construction unit. A portion of the equipment might be used by the state during the week and by the unit on the weekend. The federal government would pay a portion of the cost of the equipment. In a mobilization, the ARNG unit would deploy with the equipment with the understanding that the state or local government would be reimbursed if the equipment were not returned in good condition. In similar fashion, local hospitals or other medical facilities would support medical units in the ARNG. Employees of the medical facility and other personnel would staff the ARNG medical unit. The unit could train in the medical facility and take some of its equipment with it in a mobilization. The federal government would pay for a portion of the cost of the joint-use equipment and would reimburse the facility for equipment used in a mobilization. Similar agreements might be made with local police and even with local businesses such as the phone company and the electric company. To make this agreement attractive to unit members, constructive credit toward promotion, assignment and credit for drill times might be given for civilian jobs.

In addition, the high quality and readiness (and relatively low cost) of Air Reserve and National Guard units suggests that many highly technical active Army units like aviation (and even electronic warfare and intelligence at the corps level) might usefully be transferred to the Guard and Reserves. Even with 30 percent full-time personnel, these units would be less expensive than their active component equivalents. Moreover, they would open a new labor market for highly skilled technicians who are difficult to retain on active duty.

C. COST IMPLICATIONS OF CHANGED ORGANIZATION

The Army could respond to a budget reduction of as much as $16 billion per year and maintain its current force structure if it adopted RSO on a 50-50 basis. A shift to a 75-25 Ready-Standby basis might allow the Army to accommodate reductions of up to $8 billion. See Appendix C for further detail on these figures.

Converting ARNG units to motorized infantry would involve a substantial initial expense to purchase wheeled armored vehicles for Guard use. This cost would be significantly less than the cost of converting to heavy divisions. Over time, this expense would be offset by reduced costs for operating these vehicles as opposed to tanks and armored personnel carriers. Of course, the primary reason to reconfigure the Guard as described here is not cost savings per se, but a desire to make the best use of the full range of manpower assets available to the Army.

IV. OPTIONS FOR THE NAVY

This chapter describes a set of manpower and operations policies that form an alternative to current Navy policies. The alternative assumes that the Navy's budget is going to be cut and, therefore, the Navy is going to have to reduce active-duty manning if it wants to preserve the size of the fleet. To preserve the number of readily mobilizable ships despite cuts in funds for active-duty manning, we believe the Navy will have to find ways of providing a work environment akin to shore duty, much of the time, for sailors assigned to ships.

Again, we want to emphasize that we present a conceptual alternative, not a detailed implementation plan. If the Navy adopted something like the organization we outline, it would have additional planning to do. In addition, the Navy might well learn lessons in the course of implementation that would justify alterations in what we propose.

This chapter discusses of the potential for implementing the most significant aspect of the UCM--Ready-Standby Organization (RSO). Other aspects of the UCM, such as Cohesive Unit Policies and Inactive Service Reform, would also improve the Navy's ability to respond to the challenges facing the Navy program. The application of these other policies is not specifically addressed in this chapter.

A. IMPLEMENTING RSO FOR SHIPS

1. Special Circumstances of the Navy

Ready-Standby Organization represents a way of maintaining readily mobilizable forces despite cutbacks in budgets for active-duty pay. As described in Chapter I, RSO is most applicable to ground combat units of the Army and the Marine Corps. Some modifications would be necessary in applying RSO to the Navy. These modifications are required because the Navy cannot tie up a ship for an extended period and then quickly return it to use in the same way that the Army can store a tank. If they are to be available for use on short notice, ships require constant maintenance by skilled people.

2. Applying RSO

This section describes a way of organizing the Navy that would resemble the combat unit variant of the RSO as applied to ground forces. Ready units would be manned entirely by full-time personnel; Standby units typically would comprise some dedicated full-time personnel and a much larger number of other fully trained personnel, i.e., double-hatted individuals on active duty, individuals on Extended Leave or in the Individual Ready Reserve (EL/IRR), and retirees. Ready units would be capable of fighting on very short notice; Standby units would take longer to mobilize. The Navy application would differ from that of ground forces in two key respects: (1) Many crew members of a ship in Ready status would not remain members of that ship's crew when the ship would be in Standby status. (2) Ships would spend no more than 1 year in Ready status before transferring to Standby status, and vice-versa.

Figure IV-1 contrasts the pattern of readiness and manning under the Current System and the pattern that would obtain after application of the RSO, given the same deployment and overhaul schedule. The figure depicts 5 years between overhauls, which is close to current Navy practice for certain ships. For ships with longer periods between overhauls, the alternative described above would involve additional Ready-Standby cycles. Of course, this alternative implies a reduced operating tempo and, thus, might well result in longer periods between overhauls than those which currently obtain.

a. Ready Status

A ship in Ready status would be fully manned and would go through workup and deployment stages. Roughly 30 percent of its crew would be a "cadre crew" of full-time careerists who would stay on the ship for 3- to 4-year tours, if not the entire period between overhauls. (The cadre crew is described in more detail in the discussion of Standby status, below.) The rest of the crew would comprise what we call a "cruise crew"; it would consist of personnel who had received required individual training and then joined their prospective shipmates for intensive refresher training at the outset of a ship's ready year.

When a ship was about to leave Standby 1 or Standby 2 (i.e., overhaul) status, the membership of both the cadre crew and cruise crew would be stabilized. All personnel would have sufficient obligated service time remaining to permit them to serve at least

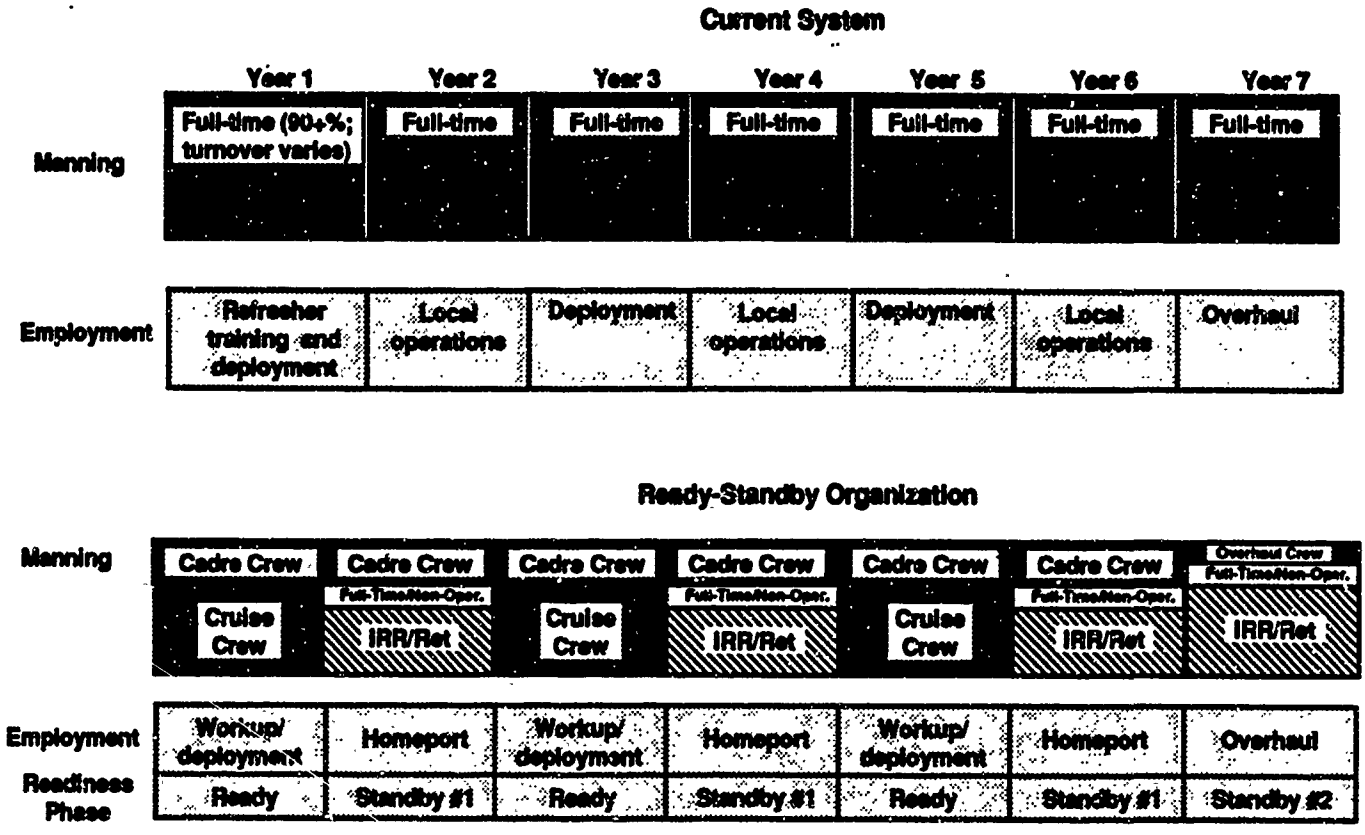


Figure IV-1. Two Ways To Man a Ship

until the next Standby period. (This practice would resemble the nucleus/balance crew approach currently used for newly constructed ships.)

Ships in Ready status would have a crew as large as those on ships today. However, owing to the prolonged service together of the cadre crew and the stabilized nature of the cadre and cruise crews from refresher training through workup and deployment, the crews of ships in Ready status might well prove to be more proficient than those of many active ships today.

b. Standby 1 Status

Ships in Standby 1 status would be manned full-time by approximately 30 percent of their normal complement. These ships would be able to go to sea for an 8-hour period only—possibly once or twice a quarter—to ensure proper equipment operation. These at-sea periods would resemble "builder's trials"—all equipment would be put through its

paces. (As noted below, the Navy might decide to augment the cadre crew for these at-sea periods, possibly through use of Naval reservists on active duty for training or crew members from other ships on Standby status.)

The majority of sailors that man a ship in Standby 1 status would be members of its cadre crew: full-time career personnel who would stay with their ship for 3 or 4 years. For nuclear-powered ships, the cadre crew would include the required complement of nuclear specialists. In addition, a Standby ship might be supported by civilians who would come from the ranks of former active duty personnel and retirees.

The fact that ships in Standby status have only 30 percent of their normal crew implies that they would have to be tied up together in home port so that the crews could pool resources to meet security, fire protection, and other requirements during non-working hours. This practice would resemble Navy practice for the Destroyer Escorts that were tied up at Newport, Rhode Island, during the Vietnam War, owing to personnel shortages.

For personnel assigned to cadre crews, service aboard ships in Standby status would resemble shore duty because ships would never be away from the pier overnight. Given RSO, therefore, the Navy would have less need to maintain shore billets for ship-shore rotation purposes. Implementation of Standby status would also provide for stability of core personnel serving aboard a particular ship. As noted above, sailors assigned to cadre crews would stay with their ship for 3 to 4 years or longer; if exceptions were made, they would be permitted only when the ship was in Standby status.

After serving 4 years in a cadre crew, a career sailor could be assigned to shore duty for a tour. After that, he would return to the cadre crew of that ship or a sister ship. Thus, it might prove possible for a sailor to spend his entire career in one home port, serving in the same ship or flotilla whenever he was not on shore duty.

In the event of mobilization, the other 70 percent of a ship's crew—termed its "mobilization crew"—would be recalled to Service aboard that ship. The members of the mobilization crew would carry hip-pocket orders assigning them to the ship; the cadre crew would know who they were, as well.

Composition of the the mobilization crew would typically differ from that of the cruise crew. To the maximum degree feasible, a ship's mobilization crew would include members of recent cruise crews (i.e., personnel who had served aboard that ship during its previous "Ready" phase and who had not since joined another crew). In addition, the

Navy could assign personnel to the mobilization crew from the following sources: (a) sailors who had left the ship for shore establishment billets (e.g., Service schools) and other full-time personnel, some of whom would be freed for duty by having recalled retirees fill their billets; (b) others in EL/IRR status who had recently served aboard sister ships of the same type, from the same homeport; (c) retirees who had recently left active service; and (d) members of Selected Reserve augmentation units such as exist today for many ships.

Two features of Standby 1 status are worth highlighting. First, the fact that a ship would spend no more than a year in Standby status reflects both maintenance and organizational realities. Keeping the ship tied up for no more than a year would prevent it from deteriorating through inattention over time. Organizationally, the proposed manning pattern makes it unlikely that ships in Standby would become "hangar queens" ravaged for spare parts by ships about to deploy. The cadre crew of the ships in Standby status would include key officers and NCOs who would be in charge of that ship when it deployed the following year; these individuals would have strong incentives to protect their ship from such use.

Second, various Navy procedures would have to change to make Standby 1 status work in the manner just described. Consider, for example, requirements for maintenance and training that the Navy has established for active duty ships. Taken one-by-one, each of those requirements makes sense; taken together, they have proven hard to meet even with a fully manned crew working long hours. For the Standby 1 concept to work, the Navy would have to reduce those requirements in such a way that the 30 percent cadre crew could meet them in the course of a normal 8-hour work day. (Otherwise Standby 1 status would not resemble a "normal" job to the extent needed to keep sailors in the Navy.) Some requirements could be eliminated or reduced in light of the fact that the ship would spend much less time at sea. Others might be lessened in recognition of the greater experience and career orientation of cadre crew members.

If the Navy pruned current requirements to the level that a 30 percent crew could meet in a 40-hour week, one result when the ship returned to Ready status could be longer periods of workup and preparation prior to deployment than characterize today's active ships. Given that result, a year in Ready status might involve less time available for peacetime forward deployment than is typical for each year in the life of an active-duty ship today. Under RSO, that outcome is acceptable; the object is to maximize the number

of ships with fully trained crews that the Navy can mobilize in an emergency, not to preserve 1980s levels of maritime presence.

c. Standby 2 Status

Ships would be in Standby 2 status during their regularly scheduled overhauls. While in this status, they would have either no crew at all or a very small "token" cadre crew—perhaps 5 percent of normal manning for ship security purposes.

d. Implied Changes in Career Patterns

Adoption of RSO would require some changes in the patterns of first-term enlisted Service. However, the initial program for both 4- and 6-year enlistees would remain the same as under the current system: after boot camp, each would go to an "A" school for basic skill training. A 6-year enlistee would then complete specialized equipment training, or "C" school. After that, each sailor would join a crew to undergo "refresher" training. (This training is some of the most useful training sailors get. It drills all the members of the crew on the kinds of crises they might face aboard ship—fighting fires, handling flooding, etc.) Next, the sailor would go into workup/deployment with his ship and could take his accumulated leave when it ended.

Upon completing this initial tour, each sailor would face a different prospect from the one afforded by the current system. The 4-year enlistee would be obligated to join a second "cruise" crew for another refresher/workup/deployment cycle on another ship. His 4-year service could be timed so that he could serve on three successive cruise crews on two sister ships. The 4-year sailor would also be subject to recall after he left active service, until he reached the end of his 8-year military service obligation. If the Navy adopted the Extended Leave proposal, the sailor would be on Extended Leave status for the first year, for which he would receive modest pay. After that, he would transfer to the IRR. For the entire period, he would carry hip-pocket orders assigning him to a ship that he had already served on. Depending on funding and readiness needs, he might attend 2-week training every year, aboard that ship in the company of its cadre crew.

After completing a regular enlistment as a member of a cruise crew, a sailor who left active service could be offered an opportunity to return as a one-year member of a cruise crew at a later date. For example, the Navy might provide qualified sailors an opportunity to volunteer for subsequent cruises as a member of a cruise crew. A sailor who has left active duty following a first enlistment might be allowed to volunteer for

subsequent cruises one year at a time. Such a sailor might be maintained on an Extended Leave status following each cruise so that he could be recalled rapidly to his ship in an emergency during its year in Standby status. Should an option of this kind prove popular, the Navy might maintain fully trained crews for Standby ships at very low cost.

At the end of his refresher/workup/deployment cycle as a member of a cruise crew, the 6-year sailor would be able to join a cadre crew for the remainder of his obligation, or to participate in two (or more) subsequent cycles of refresher/workup/ deployment. Once he did leave active service, he would be obligated for at least 2 years of inactive service on the same pattern described for the 4-year enlistee. (Ideally, current practices would be altered so that even 6-year enlistees would be obligated for 4 years after leaving active duty—1 year in EL status, followed by 3 in the IRR.)

This system would also require changes in the pattern of Service for retirees. They need not be required to return for 2 weeks' training every year, but would be subject to recall in an emergency. Retirees who had left a ship that entered Standby status within the past year would rejoin the crew of that ship; retirees whose ships had re-entered Ready status would be assigned either to the crew of another ship in Standby status or to a job in the shore establishment that would free somebody else to return to his ship.

e. Possible Changes in the Naval Reserve

The Navy could decide not to change its practices with respect to Naval Reserve ships. Under the Current System, Naval Reserve ships are not deployable; they could remain so even if RSO were applied to the rest of the Navy. Under the current system, 70 percent of those ships' crews are full-timers; they could remain so.

Alternatively, the Navy could decide to eliminate Naval Reserve ships as such, and to make them ships of the regular Navy subject to Ready-Standby Organization.

One clear advantage of this alternative is that more ships could be deployed in peacetime than would otherwise be possible. If the Navy adopted RSO for its entire fleet, the 24 Naval Reserve ships that now are not deployable would become deployable when they were in Ready status—an addition of 12 deployable ships at all times.

B. IMPLEMENTING RSO FOR CARRIER AIR WINGS

Figure IV-2 depicts the manning pattern we envision for 14 carrier air wings that could be assembled (albeit with shortages in some first-line aircraft types) from current

naval air assets. The figure assumes that at any point in time the Navy has 12 deployable carriers, plus 2 in Overhaul and 1 in the Service Life Extension Program. The figure also assumes that the Navy puts 6 of the 12 deployable carriers into Ready status, and the other 6 into Standby.

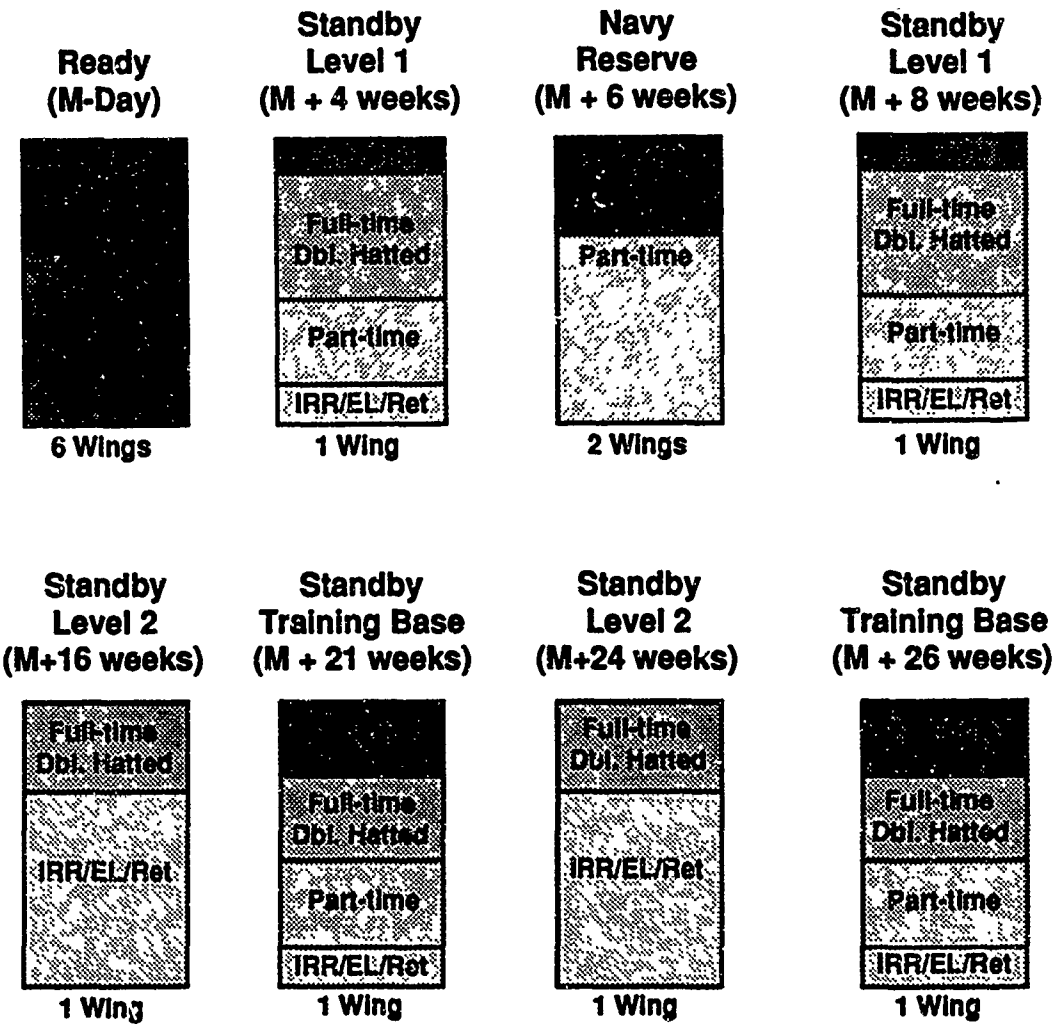


Figure IV-2. Manning Patterns and Readiness Status for Carrier Air Wings

The deployment lead times depicted in the figure (M-Day, M + 4 weeks, etc.) are illustrative estimates. They reflect (a) the fact that the amount of refresher training required is a function of the elapsed time since the pilots in the unit had most recently operated from carriers and (b) a set of particular illustrative assumptions about how much time would be required for various categories of pilots. Actual experience with the pro-

posed system might cause these estimates to be revised. In all cases, the Standby wings would be organized so they could achieve Ready status at the same time as their carriers.

The air wings of the six Ready carriers would also be Ready. The other wings would be available at various times, depending on how much time had elapsed since their personnel last operated off carriers. A Standby Level 1 wing would be composed of support personnel and pilots who had served in a Ready wing less than 18 months previously (the majority might have just returned from a deployment within the last 2 months). Because of their relatively recent experience, we assume that this wing's pilots could finish accelerated refresher training in minimum time (4 weeks). We assume that the two reserve wings would require a longer period of intensive refresher training and would be available in 6 weeks. The second Standby 1 wing would comprise double-hatted active duty pilots who had flown aboard carriers 18 to 36 months before; we assume they would need 8 week's refresher training. The other units shown would require still more lengthy refresher training since, we assume, even longer time periods would have passed since they operated off carriers.

Although this option is not a UCM proposal, it is worth noting here that the Navy also could configure the Replacement Air Groups (RAGs) for deployment in the event of mobilization for an "all-out" war. Chapter I described the rationale for doing so. Under this proposal RAG units would likely be the last first-line pilots and aircraft to deploy, since they would initially be used to prepare other pilots—via intensive refresher training, for instance—to fight. We depict tactically organized RAG units deploying to carriers relatively late because of their training mission.

C. IMPLEMENTING RSO FOR NAVY SUPPORT FORCES

The RSO can also be applied to the full range of Navy support units (intelligence, communications, maintenance, supply, etc.). The structure of a Navy support unit would be essentially the same as is portrayed in Figure I-4 in Chapter I. These units could be manned in peacetime at a minimum level appropriate to the peacetime activity level and the level at which the combat units are manned. They could be rapidly filled out with Standby personnel in an emergency. Standby provisions could work particularly well for Navy support units since the personnel on Standby would likely be the best trained in the entire unit. They might, for example, be double-hatted personnel from the training establishment (training activities can be taken over by retirees or reduced in an

emergency), members of the IRR and retirees who can be said to have reached their highest level of competence just prior to their leaving active service.

D. KEY ISSUES IN CHOOSING BETWEEN THE CURRENT SYSTEM AND THE ALTERNATIVE: DEPLOYMENT TIMES AND OVERALL FLEET SIZE

If the Navy's budget for active duty manning is cut, it need not change its current manpower practices. It can continue them, albeit on a smaller scale, with a smaller fleet. Alternatively, it can alter those practices along the lines we have described and preserve a relatively larger fleet. The former choice would imply a smaller fleet (relative to today's fleet) that the U.S. could deploy relatively quickly; the latter choice would imply a fleet that would be closer in size to today's fleet and that would take longer to deploy.

Part (a) of Figure IV-3 illustrates the difference between the deployment rates of the current fleet given (a) full-time manning (i.e., current practice) and current operating budgets and (b) Ready-Standby manning and reduced operating budgets.

The Navy could sortie the vast majority of its ships much more quickly than the rate depicted by the Full-time Manning (Current Budget) line. However, this line is not intended to depict the rate at which the Navy could simply get its ships out of port. Instead, the line depicts the fact that, starting from a no-warning M-day, it takes time to deploy a fleet fully prepared to conduct the range of operations for which its ships are designed. At any given time, for example, ships in port have various components under repair. They can leave port quickly if they have to, but they cannot all get everything repaired and back aboard ship before they do so. Similarly, they can perform other pre-deployment tasks (e.g., loading ammunition) only so quickly. Of course, some of these deficits can be made up at sea by underway replenishment. But to deploy the entire fleet fully prepared requires lengthy and thorough preparations, even with ships manned at 90 to 100 percent.

The line labeled Ready-Standby Manning (Reduced Budget) illustrates our estimate of how quickly the fleet could deploy and meet the same standard (i.e., comparably prepared to conduct the range of operations for which its ships are designed) in our proposed alternative. It would clearly take longer.

Part (b) of Figure IV-3 also compares deployment times for the fleet assuming differing manning patterns (i.e., Ready-Standby organization in one case and the Current System of 90-100 percent full-time manning in the others). However, it assumes a

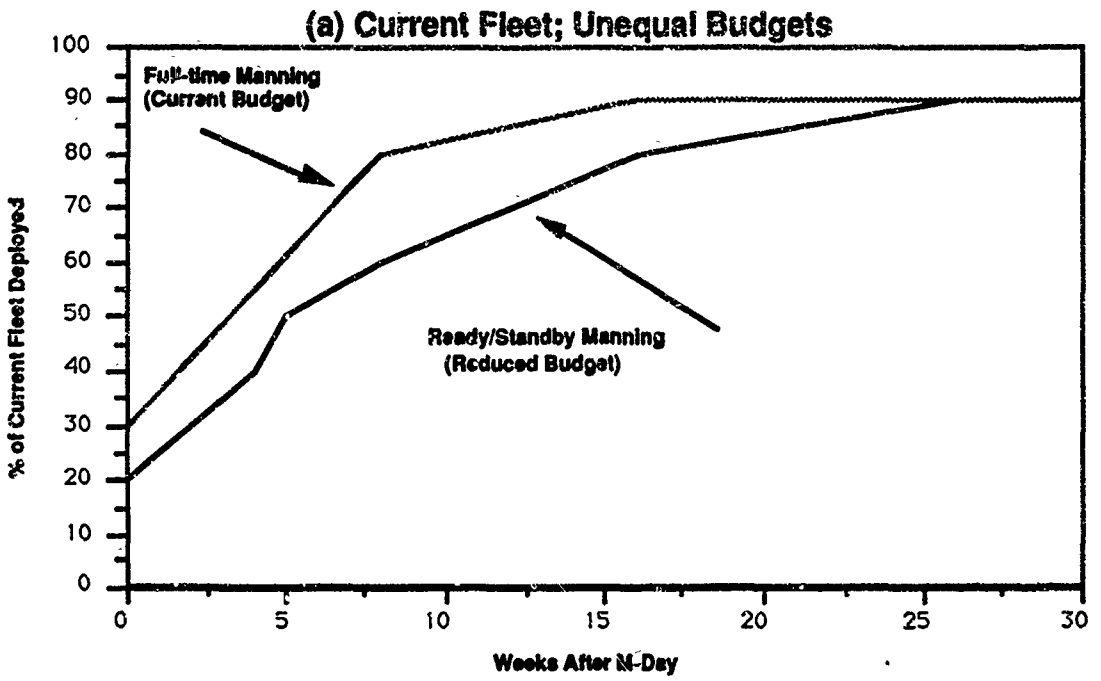
reduced operating budget and reflects the fact that such budgets will force the Navy to choose between (a) retaining its current fleet and manning it differently (e.g., by adopting the Ready-Standby concept) or (b) reducing the size of the fleet.

Given these assumptions, the schedule associated with Ready-Standby manning remains what it was in Part (a) of Figure IV-3. However, the schedules associated with the current manning system have to be lower, since funds would not be available to pay for 90-100 percent full-time crews on all ships.

The curve labeled "Full-Time Manning" in Part (b) illustrates an estimate of the deployment schedule if the Navy does not change current practices but opts, instead, to operate a fleet that is 20 percent smaller. Comparing the Full-time Manning curve with the Ready-Standby curve illustrates the nature of the choice the Navy faces if Congress reduces operating budgets to levels that can only support the current fleet under the Ready-Standby system. With such budgets, a fleet with full-time manning will remain able to deploy more quickly for about the first 12 weeks after M-day. At some point in the several weeks thereafter, however, RSO will permit the Navy both to deploy more quickly and to deploy more ships.

E. COST IMPLICATIONS OF ADOPTING THE ALTERNATIVE SYSTEM

The Navy could absorb severe budget cuts—on the order of $12 billion in annual Military Personnel and Operations and Maintenance spending—without cutting the size of the fleet that it could deploy within 6 months if it applied the RSO to its ships and to its carrier airwings with a 50-50 split between Ready and Standby units. See Appendix C for further detail on this point.



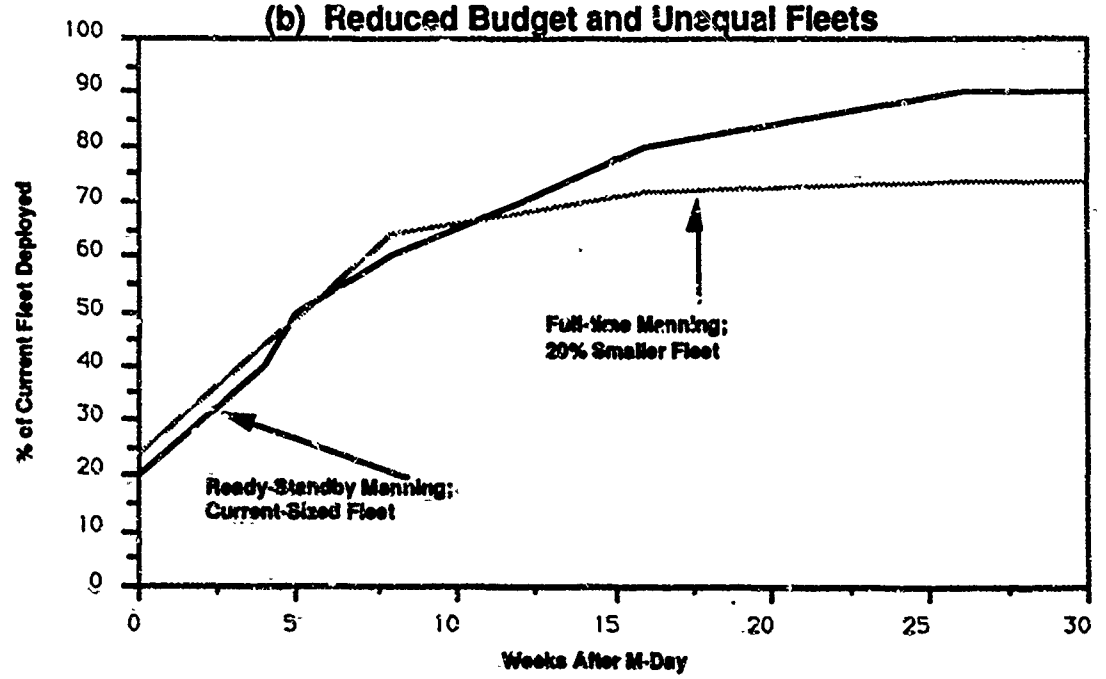


Figure IV-3. Deployment Profiles Comparison

V. OPTIONS FOR THE AIR FORCE

This chapter describes an alternative way of organizing the "total" Air Force, which includes today's active Air Force, the Air Force Reserve, and the Air National Guard. The concepts are applicable to all elements of the Air Forces. For illustrative purposes, we focus on ways to reorganize tactical fighters.

The alternative described below reflects assumptions: 1) that the Air Force's Operations and Maintenance (O&M) and Military Personnel (MilPers) budgets are going to be cut and, therefore, that the Air Force is going to have to reduce the number of full-time personnel on active duty; and 2) that, within the limits of the budgets that are available, the Air Force will want to preserve its force structure so that it can quickly reconstitute its current capability. This chapter argues that the Air Force can preserve that structure by reorganizing.

Two points are worth emphasizing. First, the proposed reorganization would exploit the investment the Air Force has made--in both hardware and trained people--over the past decade and the fact that we now enjoy much longer warning time with respect to the threat from the Soviet Union. Second, what we describe in this study is a conceptual alternative, not a detailed implementation plan.

A. IMPLEMENTING READY-STANDBY ORGANIZATION IN THE AIR FORCE

Ready-Standby Organization can be applied to virtually every part of the Air Force--flying and non-flying units, combat and support units, strategic and tactical units. The principal criterion for deciding the type of units to be converted is the level of day-to-day readiness that is needed. Should the changes in U.S./Soviet relations reduce the level of day-to-day readiness required for our strategic nuclear forces, even the Strategic Air Command could adopt RSO.

Figure V-1 shows the types of squadrons that could comprise a wing RSO. The Air Force could create Standby units that would be associated with Ready units manned by full-time active component personnel. For example, if the Air Force chose to cope with reduced operating budgets by creating a three-to-one Ready-Standby mix, it could assign four

squadrons of aircraft to each wing--three Ready squadrons and one Standby squadron. A two-to-one mix could result in two Ready squadrons and one Standby squadron in a wing. Regardless of the mix chosen, the wing commander would be responsible for all of the people and aircraft assigned to his wing (i.e., both those assigned to full-time jobs in the wing in peacetime and others described in the next paragraph). The full-time personnel assigned to the wing would fly and maintain all of the aircraft in it by cycling through the planes assigned to each of the four squadrons.

Figure V-1. Proposed Air Force Wing Composition

Fully trained personnel would man Standby units, but not on a full-time basis. Instead, Standby units would include a small number of full-time personnel and a mix of others who would have served in the associated Ready unit and come from the same sources that contribute to Standby units in the other Services. This mix would include: a) double-hatted personnel (i.e., full-timers who had recently left the Ready unit to go to non-operational jobs elsewhere in the Air Force; for example, a pilot holding down a desk job in the Pentagon); b) newly retired personnel who had recently served in the associated Ready unit (and who would remain assigned to that unit for a period of years depending on the physical requirements of the job); c) former members of the associated Ready unit who would be members of the Individual Ready Reserve (IRR) and who could be on

Extended Leave (EL) during their first year after active service and, d) Selected Reservists who had served with the associated Ready unit.

Call-Up units could be created if additional reductions in operating costs were required. These units would have a mix of full-time non-operational and EL/IRR/Retired personnel and a dedicated set of equipment assigned. The equipment would most likely be in storage. The personnel in the unit would know that they were in that unit, and would be selected to maximize the extent to which they had served with each other in the past. In addition, they could be required to conduct periodic refresher training as a unit. In the event of mobilization, they would be augmented by newly recruited and trained personnel.

Ready-Standby Organization can also be applied to the full range of Air Force support units (intelligence, communications, maintenance, supply, etc.). The structure of an Air Force support unit would be essentially as is portrayed in Figure I-4 in Chapter I. These units could be manned in peacetime at a level appropriate to the level at which the combat units are manned and could be rapidly filled out with Standby personnel in an emergency. Standby provisions could work particularly well for Air Force support units since the personnel on Standby would likely be the best trained in the entire unit. They might, for example, be double-hatted personnel from the training establishment (training responsibilities can be taken over by recalled retirees or reduced in an emergency), members of the IRR, and unit retirees who can be said to have reached their highest level of competence just prior to their leaving active service.

Although the development of RSO has focused primarily on active component units, it is applicable to the Total Air Force. Reserve component units can take advantage of fully trained personnel who have served in their units and who would otherwise be lost to the service when they depart their unit. Reserve units can use Standby personnel to augment Ready units or to man entire Standby units.

B. OTHER UCM POLICIES

Other aspects of the UCM, such as Cohesive Unit Policies and Inactive Service Reform, would also improve the Air Force's ability to respond to the challenges it faces. Assigning fully trained members of the IRR and retirees to their former units would help to provide the manpower the Air Force needs early in a conflict when it is surging at sortie rates far higher than normal. Requiring airmen who reenlist to agree to an extension of their IRR commitment will ensure the availability of larger numbers of

skilled and experienced personnel. The application of these and other policies is not specifically addressed in this chapter.

C. OTHER CONCEPTS FOR ENHANCING THE TOTAL AIR FORCE

1. Transfer Aircraft to Air National Guard and Air Force Reserve Units

One way to maximize the number of fully trained and readily mobilizable Air Force units involves transfer of aircraft to the Air Force Reserve and Air National Guard. For example, the Air Force could assign Guard and Reserve squadrons enough aircraft (112) to bring them up to 24 aircraft apiece. In addition, it could create new Guard and Reserve units.

Guard/Reserve squadrons are highly proficient and quickly mobilizable today. In addition, recent research suggests that, owing to the long flying experience of pilots in such squadrons, Guard and Reserve pilots may be more proficient than those of today's full-time units.[1]

2. Organize TFTWs for Combat Deployment

The Air Force has assigned TFTWs a secondary mission of continental air defense and apparently considers their aircraft to be available to meet attrition demands in wartime. However, it is not clear that the Air Force has provided the spare parts and other items necessary to employ these aircraft as attrition fillers. Apparently, the Air Force envisions operating the TFTWs for pilot training purposes during any future war. It does not plan to suspend pilot training for a period of time in wartime, or to deploy TFTWs as combat units during that period; it has not organized its Tactical Fighter Training Wings in ways that would facilitate doing so.

Chapter I described several reasons why the Air Force might want to configure its TFTWs for combat missions overseas. By configuring TFTWs for temporary overseas deployment in wartime, the Air Force would create at least four additional tactical fighter wings equipped with 305 F-15, F-16, and A-10 aircraft. This would permit the elimination of older aircraft without the loss of force structure. Alternatively these older

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[1] Recent research shows that pilot proficiency is a function of lifetime flying hours and, to a lesser degree, of the amount of recent flying experience. It indicates that pilots with a lot of lifetime flying experience reach proficiency levels that cannot be attained by less experienced pilots, no matter how intensively those pilots have flown recently. See Stanley A. Horowitz and Colin Hammon, Flying Hours and Aircrew Performance, Institute for Defense Analyses, January 1990.

aircraft (F-4s and A-7s) might be placed in storage where they would represent equipment for less ready "Call-Up" units.

D. READINESS LEVELS OF ALTERNATIVE AIR FORCE UNITS

Figure V-2 arrays unit types in a way intended to roughly describe the amount of time required before they could be sent into combat. Thus, Ready units, Reserve units, and Guard units are all listed in the same leftmost column, indicating that they are all prepared for combat on very short notice. Standby TFTW units are next, because they could be prepared to fight soon thereafter. (This does not mean that Standby TFTW units would necessarily be the next to go; indeed, that is unlikely since such units would be required to conduct refresher training for personnel recalled to join other Standby units.)

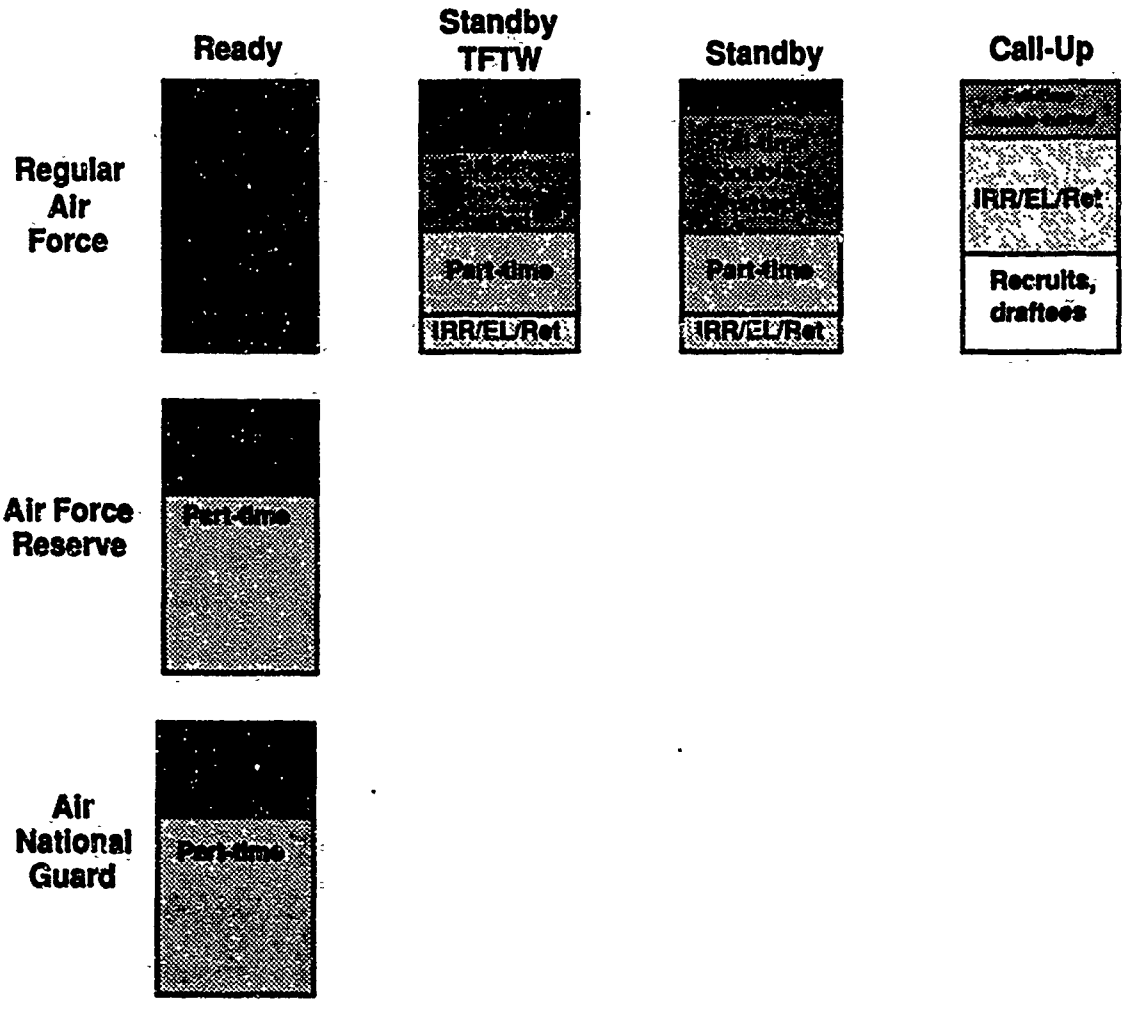

Figure V-2. Proposed Air Force Manning Patterns

For simplicity, Figure V-2 depicts other Standby units still farther to the right. Note, however, that some Standby units could be configured so as to be able to deploy as early or even earlier than Standby TFTWs. Such units might have a larger fraction of full-time non-operational (i.e., "double-hatted") personnel, part-time personnel, and EL/IRR/retiree augmenters. Alternatively, specially prepared Standby units might have those personnel in the exact proportions indicated, but would conduct refresher training more frequently than less prepared Standby units.

Call-Up units are depicted even farther to the right for two reasons. First, they would take longer to train since some of their personnel would be new to the Air Force, in contrast to the fully trained and experienced personnel that constitute all the other units shown. Second, their aircraft would require time to prepare for combat since they would be "pickled" in non-flyable storage until mobilization.

Figure V-2 does not indicate the amount of lead time that each kind of unit would require before being fully prepared for combat. We can be confident that Ready, Guard, and Reserve units would be able to fight very soon since the Air Force has repeatedly demonstrated the readiness of such units. Estimating lead times for other units is more problematic since the Air Force does not have experience with them.

It is worth emphasizing here that we are presenting an alternative concept about organizing the Air Force, not a plan that must be followed in all particulars. The personnel proportions depicted in Figure V-2 are illustrative (and the basis for our cost estimates) but are subject to revision based on experience. For example, the Air Force might find that, owing to their long experience on active duty, maintenance personnel who have been retired for several years can more quickly complete refresher training than can personnel who served on active duty more recently but for shorter periods of time. If so, the Air Force might want to rely more on retirees than on IRR personnel for its most prepared Standby units.

Of course, the personnel proportions depicted in Figure V-2 describe units that can be prepared for combat with some amount of lead time. Since we assume that we are going to enjoy longer warning in the future than we have assumed available in the past, it follows that units composed in those proportions are inappropriate only if they would require an even longer warning time, or if units organized in other ways could be ready sooner at equal or lower cost.

Of course, the proportions described may or may not represent the least-cost way of attaining a force that could come closest to meeting a given deployment schedule. The Air Force will learn more about how quickly various categories of people can come back up to speed in the course of operating a system with the mixes we suggest. On the basis of that knowledge, it can determine the best assignment practices.

E. COST IMPLICATIONS OF REORGANIZATION

Table V-1 summarizes the results of estimates that are discussed in greater detail in Appendix C. The table provides estimates of the impact of configuring the regular Air Force tactical fighter force with a 50-50 mix of Ready and Standby units, of configuring its TFTWs for overseas combat, and of fully equipping the Air Guard and Reserve. Additional cost avoidance possibilities exist for applying these concepts to the Total Air Force. For example, if the entire Air Force (and not just the tactical fighter force to which Table V-1 refers) were facing a $7 billion annual cut, it might act to preserve current force structure by transferring 25 percent of the active component mission force to Standby status. See Appendix C for further detail.

Table V-1. Responses to Hypothetical Budget Cuts

BUDGET REDUCTION	RESPONSE
$ 0.2 B	1. Fill out existing AFR and ANG Tactical Fighter Wings with 72 aircraft each
$ 0.7 B	2. Configure Tactical Fighter Training Wings for combat and eliminate an equivalent number of active units
$ 2.2 B	3. Place 50% of all Tactical Fighter Wings in Standby Status

VI. OPTIONS FOR THE MARINE CORPS

This chapter describes a way of adapting Unit Cohesion Model (UCM) policies in the Marine Corps.

A. IMPLEMENTING UCM POLICIES IN MARINE GROUND UNITS

This section describes how UCM policies might be applied to Marine ground units, noting similarities and differences with applications to the other Services and describing how the same concepts could be applied at two different levels of budget and active-duty end-strength.

1. Ready-Standby Organization

Figure VI-1 depicts an application of the Ready-Standby Organization (RSO) to the Marine Corps that accommodates the Marines' mission and sequential training and deployment requirements. This application assigns Marine units to several categories of readiness, as described below and shown in the figure. Ready and Standby 1 units would be managed by the Fleet Marine Force (FMF), while Standby 2 and Call-Up units could be managed by the FMF or by Marine Corps Districts. Table VI-1 shows the potential for applying RSO to other Marine ground units with a 75/25 percent split between Ready and Standby 1 units.

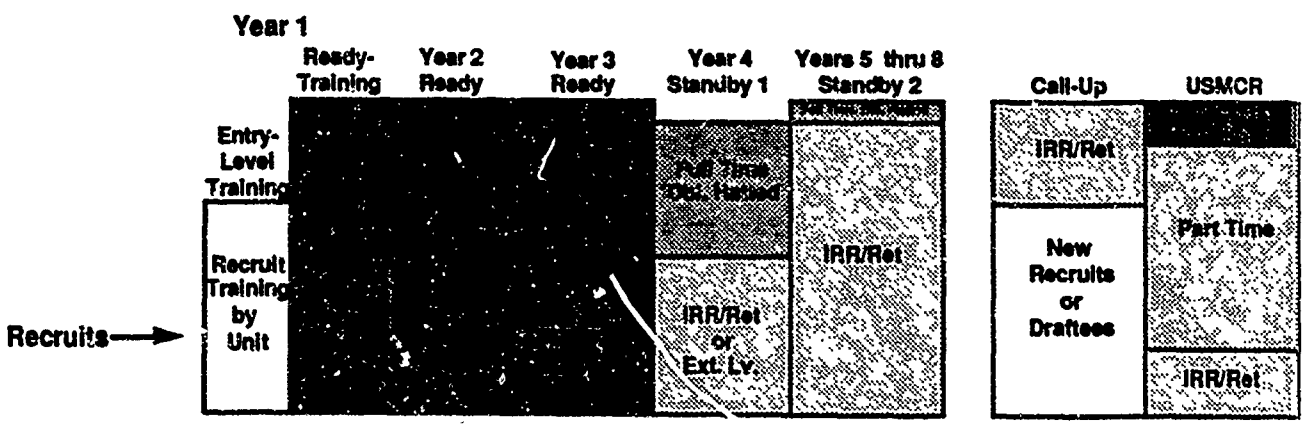

Figure VI-1. Marine Application of Ready-Standby Organization

a. Entry-Level Training

Upon enlisting in the Marines, a recruit would proceed to Parris Island or San Diego for training—not simply as a civilian joining the Corps, but as an assigned member of a particular Marine unit (e.g., 3rd Battalion, 9th Marines). The other recruits in his boot camp platoon would also be members of that unit.

Initial training would last 6 months. Towards the end of that period, Marines destined for other than infantry billets would go to schools in their Military Occupational Specialty (MOS) (e.g., heavy weapons, supply, and communications). They would remain members of the unit with which they had been training. Consequently, they would not languish in limbo as they might if they had to wait for another class to be formed at the schools they needed. Instead, they would be members of a unit, with a unit commander responsible for ensuring that their time was put to good use.

b. Ready-Training Status

After successfully completing initial training, Marines who had already trained together for 6 months would commence a predeployment training cycle in the company of noncommissioned officers (NCOs) and staff NCOs who had also been assigned to 3/9 and many of whom had previously served together in the 9th Marines. (We discuss the status of these more senior Marines later on.)

c. Ready Status

Once the unit completed its predeployment ("lock-on") training, it would leave Ready-Training status and enter Ready status for 2 or 3 years. While in this status, the unit would participate in a unit deployment cycle comparable to that of active duty Marine units, e.g., Marine Expeditionary Units/Special Operations Capable (MEU/SOC) under the current system.

d. Standby 1 Status

Upon completing its Ready status tour, the unit would begin a year in Standby 1 status. At that time, some Marines would leave active service to retire. Others would leave to enter the Individual Ready Reserve (IRR) (or, if current procedures were changed, could begin a year on Extended Leave (EL) to be followed by transfer to the IRR.) Regardless of their choice, these Marines would all remain members of 3/9 and would have hip-pocket orders to rejoin 3/9 in the event of mobilization.

Marines who stayed on active duty when their unit entered Standby 1 status would be assigned to various "nonoperational" jobs. For example, all subsequent Marine education, about one-third of a career, would occur while the Marine was in Standby status. (Other nonoperational jobs could include sea duty, embassy duty, Marine barracks duty, and the like.) After completing schools during the first half of their Standby 1 year, some of the NCOs, staff NCOs, and officers would also be assigned to newly formed units in Ready-Training status, which would soon begin predeployment training. In the event of mobilization, some of these officers and NCOs would remain with the unit in Ready-Training status; others would return to their Standby 1 unit. To avoid the appearance of double-counting these Marines, Figure VI-1 uses a truncated rectangle to depict the number of "double-hatted" personnel who would mobilize as members of a Standby 1 unit.

Table VI-1 shows how the RSO could be applied to a variety of Marine ground units with a three-to-one Ready-Standby mix. In such a case, with no Standby 2 units, the Marine Corps might use the personnel who would otherwise be in Standby 2 units as a cadre for Call-Up units or as replacements for Marines who are not in the Fleet Marine Force (FMF) and who are called to return to their Standby 1 units.

Table VI-1. Numbers and Types of Marine Units by Readiness Status

Readiness Status	Numbers and Types of Units							
	Infantry BN	Artillery BN (D.S.)	Recon COs	AAV COs	Tank COs	Artillery BTRY (G.S.)	LAI COs	ENGR COs
Ready-Training (Year 1)	9	2	3	3	3	2	3	3
Ready (Years 2&3)	18	4	6	6	6	4	6	6
Standby 1 (Year 4)	9	2	3	3	3	2	3	3

e. Standby 2 Status

In the fifth through eighth years of a notional 8-year obligation, Marines who remained in the nonoperational force for more than a Standby 1 year would be assigned to Standby 2 units. Active-duty Marines would remain in this status until they returned to service in a Ready unit. Members of the IRR would be subject to recall to this unit for as long as their service obligations lasted. Retirees also would be subject to recall to this unit for the first few years after they left active service. (After that time, they would still be subject to recall, but might be used in other roles discussed below.)

The Marine Corps could adopt the Ready-Standby Organization as described above without any changes in current regulations. However, the system would work better if the Marine Corps adopted the mandatory inactive service extension and Extended Leave elements of the UCM. The former policy would require Marines to assume a 4 year inactive service commitment every time they extended their active-duty service obligation. The latter would imply that, during the first year in inactive service, a Marine would explicitly be on Extended Leave from active duty with his most recent active unit. Marines would receive modest pay while on Extended Leave. (In the event of recall to active service, a non-monetary inducement ought to derive from the fact that a Marine would be recalled to a unit filled with his Marine buddies, not a group of strangers.)

Units in Standby 2 status would be formed by joining together groups of Marines that had served together in two (or more) different units while in Ready status. This practice would be necessary to avoid understrength units since (as discussed above) Marines on active duty could be assigned to a Ready-Training unit during their year in Standby 1 status or at the end of their Standby 1 year. In either case, they would not be available for a Standby 2 unit. Once implemented, this practice would likely lead to formation of over-strength units, a desirable outcome for two reasons. First, overstrength units would reduce the possibility that Marines who had trained together in a Ready unit would be separated from each other when in Standby 2 status, thus diminishing unit cohesion and proficiency. Second, Standby 2 units would have no source of replacements; overstrength at time of formation would enable them to withstand peacetime attrition over the period in Standby 2 status.

Although their members would likely come from two different Standby 1 units, Standby 2 units would still display fairly high levels of cohesion, especially at the company and platoon level. This could be accomplished by keeping individuals from the

same Standby 1 units together by consolidating battalions into companies and companies into platoons. Marine units and personnel in Standby 2 status could be organized into a fifth Marine Expeditionary Force.

f. Call-Up Units

Marine NCOs and officers who have left active service and whose units have completed their term in Standby status could be formed into what we term "Call-Up" units. Upon mobilization, Call-Up units would be filled with recruits who would begin training as a unit.

Call-Up units are appropriate for longer mobilizations and wars. They can be employed in one of two ways. If equipment is available, they can deploy and fight like any other Marine unit. Alternatively, they can provide "packages" of trained Marines for use as unit replacements. In either case, the first-term Marines in the Call-Up unit would be assigned only to the unit of which they had been members ever since they had entered the Corps. Call-Up units would be especially important for training Marines who suffer high attrition in combat (e.g., infantry).

2. Selected Reserve

On leaving active service in a Ready unit, some Marines may want to enter the Selected Reserve. In some cases, the Marines might drop that individual from his Standby 1 unit. Alternatively, Marines might join and drill with Selected Reserve units as under the current system, with the understanding that, if mobilization were to occur when their active-duty Ready unit was in Standby 1 status (i.e., during their first year after completing active service), these Marines would return to service with their active-duty unit, not with their drill unit in the Selected Reserve. If mobilization were to occur afterwards, Marines who had been members of that Standby 1 unit would remain members of their Selected Reserve unit and would mobilize with it.

3. Implications of Implementing UCM Policies in the Marine Corps

a. Patterns of Wartime Reconstitution

If the Marine Corps were to adopt Cohesive Unit Policies instead of the Individual Replacement system, it would have to change its practices concerning wartime replacement. Instead of relying on a stream of individual replacements to keep combat units up to strength, it would allow such units to fall in strength until they were no longer

combat-effective. At that point they would be removed from contact and either consolidated with another hard-hit Marine unit or reconstituted with packages of Marines who had already been trained and indoctrinated into both the Corps and their particular unit. After training together as long as the situation permitted, these units would return to action. This practice would imitate the *Wehrmacht* practice that was essential to German Army effectiveness during World War II.[1]

b. Saving Our Investment in Small Unit Leaders

A decision to adopt the mandatory inactive service extension would permit the Corps to derive wartime benefits from a group of highly trained Marines that the current system does not use well and risks wasting altogether in the course of upcoming force cutbacks: the trained and experienced Marines who leave the Corps after the end of their 8-year service obligation but before retirement. It is not critical to retain, beyond their 8-year military service obligation, IRR Marines who may have spent 3 or 4 years on active duty. But it may prove vital to be able to recall the relatively young officers and NCOs who spend as many as 8 to 10 years on active duty and who cannot be recalled if they leave active service under the Current System. These people can provide leadership in Standby and Call-Up units that cannot be provided any other way; the alternative is to "grow" another generation of junior leaders in the ranks, a process that would take both time and money that may not be available.

c. Changes in Managing EL/IRR Marines

If the Marine Corps were to adopt unit-affiliated IRR recall, it would have to change the way it manages IRR Marines. Today, the Corps plans to assign Marines to units without regard for their previous unit affiliation. It could instead adopt unit-affiliated recall. If it did so, IRR Marines would maintain their affiliation with the units with which they had served while on active duty, and their unit would maintain contact with them and arrange for their training. Headquarters Marine Corps would establish overall policy and would manage IRR personnel and financial records.

Note that the Marine Corps could adopt unit-affiliated recall (and thus enhance cohesion) even if the individual replacement system remained in effect for active-duty units and even if the Corps did not implement Extended Leave or adopt RSO.

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1 For details on German practice (and on the contrast with practices of U.S. units), see Martin van Creveld, *op. cit.*

Alternatively, the Marine Corps could adopt the Extended Leave provision (and thus enhance the availability of trained Marines) without adopting RSO or other UCM policies.

d. Changes in Managing Retired Marines

A decision for Cohesive Unit Policies and RSO would require changes in how the Corps managed its retired Marines. In particular, the Corps would have to plan to assign recently retired Marines back to their old units in the event of emergency. In addition, it would have to greatly expand the extent to which it plans to use retirees to free up active-duty Marines for the other assignments.

Although these measures would likely have greatest impact if adopted along with other Cohesive Unit Policies and with RSO, they still would be attractive options even if the Marine Corps chose to retain the Individual Replacement System and decided against the RSO.

4. New Roles for District Headquarters

If the Corps adopted RSO and Cohesive Unit Policies described above, its existing regional district headquarters could be converted to Regimental Depots and assigned several new responsibilities. These could include oversight of Standby 2 and Call-Up units, management of Individual Ready Reserve (IRR) Marines who had served in that Regiment, and recruiting.

B. APPLYING RSO TO MARINE AIR UNITS

1. Marine Air Unit Readiness Categories

a. Ready

Ready units would be manned entirely by full-time Marines, as active-duty units are today.

b. Standby

The Marine Corps could respond to budget cuts without reducing the number of fully trained and readily mobilizable Marine air units by creating Standby units. Fully trained Marines would man Standby units, but not on a full-time basis. The peacetime complement of Standby units would include a small number of full-time personnel and a

complement of Standby units would include a small number of full-time personnel and a mix of others from the same sources that contribute to Standby units in the other Services. This mix would include: (1) Marines holding full-time non-operational jobs elsewhere in the Corps; (2) retired Marines who recently served in comparable operational jobs; (3) Marines on Extended Leave during their first year after active service; (4) Marines in the Individual Ready Reserve; and (5) in some cases, Selected Reservists. For improved cohesion the members of the Standby unit could be required to have served in the associated Ready unit and thus would be assigned to Standby units alongside people with whom they had served cn active duty.

Each of the Standby units so comprised would be associated with a Ready unit manned by full-time Marines. For example, if the Marine Corps chose to respond to reduced operating budgets by creating a three-to-one Ready-Standby mix, it could assign four squadrons of aircraft to each Group. The Group Commander would be responsible for *all* of the Marines assigned to his group, not just for those assigned to full-time jobs in peacetime. The full-time Marines assigned to the wing would fly and maintain all of the aircraft in it by cycling through the aircraft assigned to each of the four squadrons. Figure VI-2 depicts the application of this concept to Marine Air units.

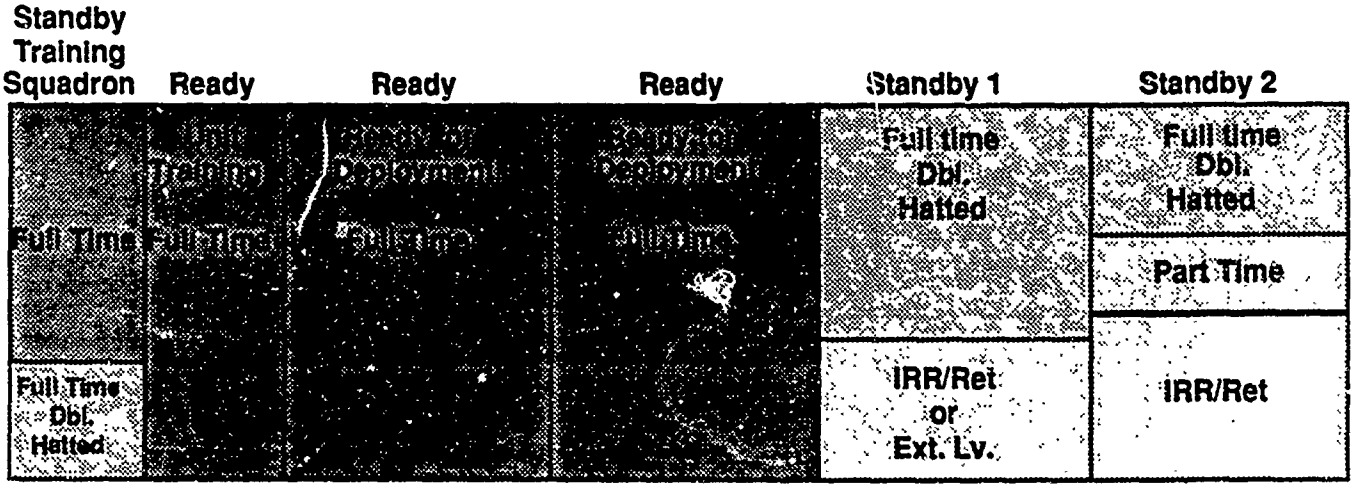

Figure VI-2. Ready-Standby Organization for Marine Air

2. Selected Marine Corps Reserve

The Selected Marine Corps Reserve could be kept as it is today or it could be augmented by Standby personnel who have departed the unit but remain available in the IRR or retired populations.

3. Career Patterns and Deployment Schedules

a. Current Practices

Marine aviators currently serve 2 years 6 months in training before joining their unit. Ideally, they join their squadron at the beginning of a 6-month period in unit lock-on, followed by a 2-year deployment cycle. Given a 6-year period of obligated active service, some Marine pilots reach the end of their 6-year active service part-way into the unit's next deployment cycle.

First-term enlisted Marines train between 12 and 18 months before joining a unit for the 2.5-year lock-on deployment cycle just described. Thus, the unit deployment cycle ends at the same time as the 4-year enlistment of the Marine who spent 18 months in training before joining the unit. Marines who took 12 months to train would serve for 6 months of the next cycle before leaving active service.

b. Practices Under the Ready-Standby Concept

To develop the most cohesive and proficient units possible, the Marine Corps needs to reduce personnel turbulence. It could do so by adjusting the Marines' active service to reflect the amount of time they spend training, and the length of their units' deployment cycles.

Pilot training is costly in time and money. If budget cuts force the Corps to reduce the size of its active force, one response would be to change the active obligation expected of Marine fliers. Instead of a 6-year term of active service, for example, Marine aviators might commit to two 2.5-year cycles of unit lock-on/deployment after their 2.5 years in initial training. In addition, they could incur a 4-year inactive service obligation when they join or when they are accepted for flight school. Similarly, enlisted Marines could sign up for terms of service that include sufficient time for training and one or two lock-on/deployment cycles (depending on the duration and costs of their initial training), followed by a 4-year inactive service obligation.

4. Converting Marine Training Squadrons to Standby-Training

In peacetime, Standby-Training squadrons would have the same makeup as do Marine training squadrons today—a full complement of support personnel and a complement of instructor pilots. In an emergency, however, Standby-Training squadrons could be augmented with pilots and other personnel from several sources. These would

include active-duty Marines holding nonoperational jobs (e.g., a desk job in Washington), Marine pilots who have left full-time active duty but flown on a part-time basis since that time to maintain proficiency (in a program that would have to be initiated for this purpose), and EL/IRR/Retired Marine pilots who recently left service with an active squadron. Each of these potential augmentees would carry hip-pocket orders assigning him to the Standby-Training squadron; the Commanding Officers of those squadrons would know who his augmentee pilots were and would involve them in proficiency training and other unit activities to the extent his resources allowed.

The rationale for creating Standby-Training squadrons in the Marine Corps is analogous to the rationale for doing so in the other Services described in Chapter I.

By configuring its training squadrons as just described, the Marine Corps could create combat units equipped with 18 F-18, 18 F-18 B/D, and 6 KC-130T aircraft and 4 helicopter squadrons. (Marine F-18s are already assigned a backup role in continental air defense; our proposal envisions using them in the primary mission of Marine aviation—support of Marines on the ground.) The helicopters would need additional equipment (e.g., navigation aids) to be fully operational. 18 AV-8B aircraft in Marine training units are already assigned an additional operational attack role, so the proposal outlined here would involve less change from current plans for AV-8 units. Indeed, apart from how these squadrons would be augmented with personnel, this proposal calls for using other Marine air training assets analogously to AV-8Bs.

Marines flying EA-6Bs and A-6Es are currently trained in those types by Navy training squadrons. Marines flying OV-10s get training in type on Air force OV-10s.

Thus, it is clear that configuring Marine training squadrons as described would not bring the dramatic payoff we observed in the other Services. Even so, the idea is worth considering.

C. BUDGET AND FORCE SIZE ALTERNATIVES

The Ready-Standby system can be applied at different budget and force levels. A 75/25 percent mix of Ready and Standby units could allow for a 25 percent reduction in manning and in operating costs of Marine ground and air forces. At this level it would be possible to organize only Standby 1 units. A demand to adjust to larger spending cuts could lead to the use of Standby 2 and Call-Up units.

Figure VI-3 shows how the system could be applied to Marine infantry battalions. Compared to today's 24 battalion force, with a smaller number of Marines in Ready battalions (either 22.5 or 15 battalions of full-time Marines), the Marine Corps could have the potential of fielding either 40 or 27 battalions, counting both Standby 1 and 2 units but not counting Selected Reserve or Call-Up units. Looked at another way, the 40 battalion option allows the Marines to reduce infantry battalion manning by approximately 6 percent while increasing the number of deployable battalions by 67 percent. The 27 battalion option provides for a 37 percent manpower reduction without reducing the number of deployable battalions.

Figure VI-2 shows the potential for organizing both rotary and fixed-wing units with 60 percent of the force in a Ready or a Ready-Training status and 40 percent in a Standby 1 status. A less dramatic adjustment would have 75 percent Ready and 25 percent Standby. See Appendix C for further costing detail.

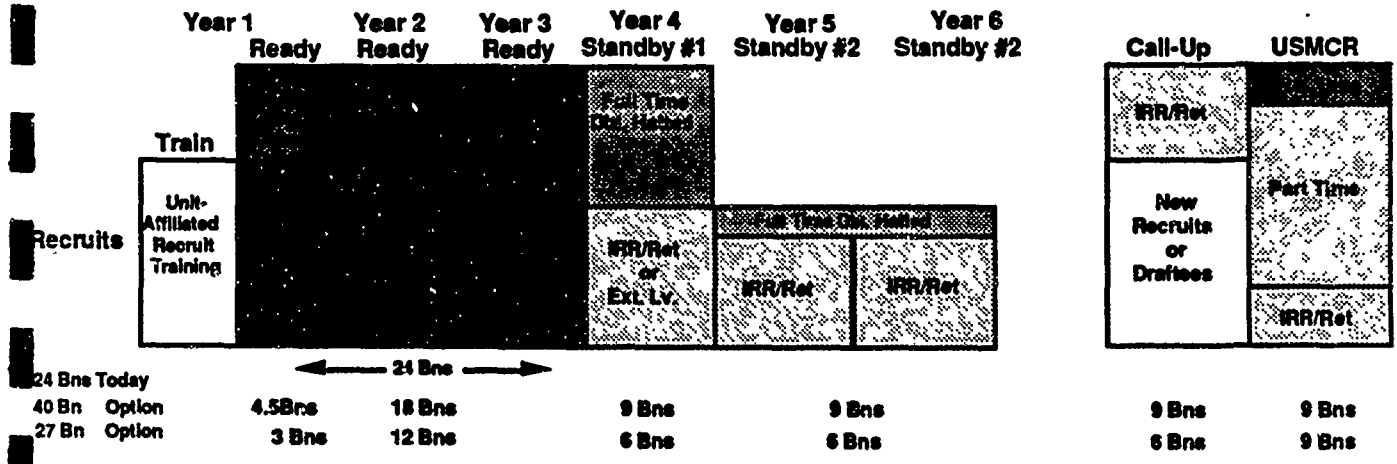

Figure VI-3. Application of Ready-Standby Organization and Options For Marine Endstrength

VII. TOPICS FOR FURTHER RESEARCH

The options in the preceding chapters raise a number of issues for further research. This chapter provides a summary review.

A. LONG SERVICE, COHESION, AND UNIT EFFECTIVENESS

1. Working Hypothesis

Figure VII-1 depicts our hypotheses about the combat effectiveness of units produced by the Current System compared with that of units produced by the UCM. This section restates Chapter I's description of those hypotheses.

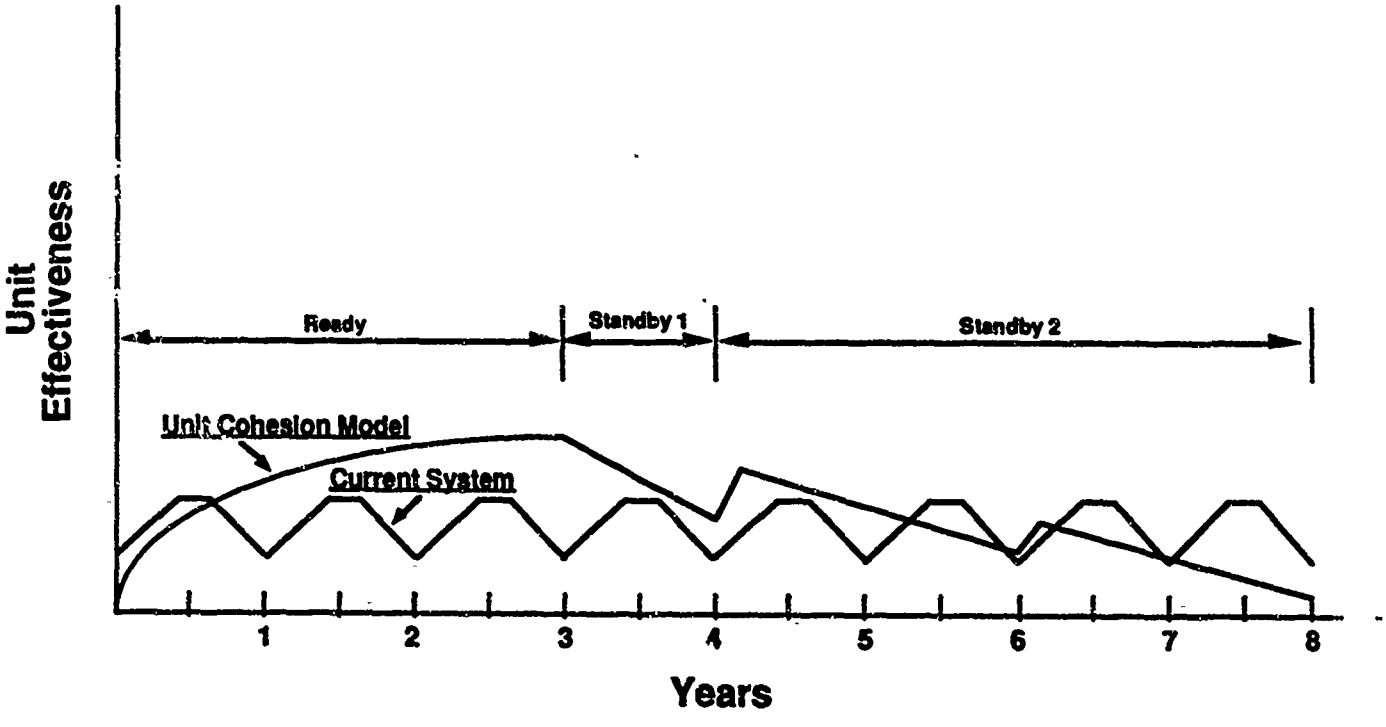

Figure VII-1. Combat Effectiveness Hypothesis

a. Unit Effectiveness Under the Current System

The line with the saw-tooth pattern in Figure VII-1 reflects our estimate of unit effectiveness in the Current System. That system is heavily influenced by constant personnel turbulence and event-driven training. As a result of this high turbulence the unit cannot get beyond a certain level of unit proficiency because there is a constant influx of new, relatively untrained people and loss of trained people. The unit, therefore, frequently returns to the most basic unit training procedures and never achieves the cohesion and proficiency which characterize first-rate formations.

The unit achieves its highest level of unit proficiency around the time of a major training event, such as a deployment to the National Training Center (NTC). In anticipation of this event, the unit temporarily stabilizes its personnel and training becomes more progressive. The unit does not maintain its increased proficiency for long, however, because 40 to 50 percent of its personnel are typically rotated out of the unit within 4 months of returning from the NTC.

b. Unit Effectiveness Under the UCM

The higher curve in Figure VII-1 depicts our estimate of unit effectiveness under the UCM. At the beginning of its term in Ready training status, a unit would be less effective than a unit in the Current System because none of its members would have trained together in that unit. Over time, though, the UCM unit would improve, eventually becoming more effective than a unit under the Current System. Its superior effectiveness would result in part from the fact that it would not have to re-learn the basics; instead, its members could perfect individual and unit skills over a much longer period. In addition, greater combat effectiveness ought also to result from greater unit cohesion.

After a UCM unit completed its period in Ready status, its effectiveness would begin to decline. Most of its members would no longer be working together and, to some degree, they would get out of shape and forget what they had learned.

At the outset of its year in Standby 2 status, the unit's effectiveness could be increased by bringing its members back together for refresher training. After that time, the unit's effectiveness would begin to fall again.

2. Key Issues in Testing the Hypothesis

The hypothesis depicted in Figure VII-1 raises several issues for further research. Most broadly, what should be the shape of the two curves, and their relative height? This question implies several others.

a. Measuring Unit Effectiveness

How should we measure unit effectiveness? A desirable measure would not simply summarize the level of individual skill across the members of a unit; it would also capture how well that unit could perform in demanding situations. It would reflect the capabilities of the entire unit, and not just the skills of the unit commander. Thus, we want to measure how well a unit performs its mission in exercises in which many key officers and NCOs have been "killed." Efforts have been made to gather data on unit performance at the National Training Center; evaluation of these efforts should inform research into the difficult issue of measuring unit effectiveness.

b. Measuring the Effects of Refresher Training

How should we account for the effects of refresher training? If the UCM were implemented, Standby units would likely have at least a few weeks to train between the time of recall and the time that they would be committed to action; indeed, the same point holds for full-time active-duty units in the Current System, except for the ones on alert for immediate deployment. In light of this circumstance, the most accurate measures of unit effectiveness (and of individual skills as well) would not be performance on mobilization day, but performance some time later, after refresher training. It is clear that a unit would not perform as well on the day it was recalled as it had at the end of its previous period of active-duty training and that its members would likely re-learn their old skills more quickly than would a group of strangers. What is not clear is how good the unit would be after refresher training, relative to its effectiveness when last on full-time active duty.

c. Measuring the Effectiveness of Standby Personnel and Units

How does the potential contribution of retirees, EL/IRR personnel change over the time they spend in inactive duty status? Similarly, how would the potential contribution of double-hatted active duty personnel change over the period that they spend assigned to Standby units, but performing other jobs? It could be that the potential contribution of personnel in each category degrades at different rates. Or it could be that the rate of degradation varies much more within the members of each group than it does between

members of one group and members of another. If we knew the answers to such questions, we could better design programs for refresher training, and improve planning for the recall of Standby units.

d. Measuring the Effects of Unit Types and Post-Military Vocations

How would the shapes of the two curves in Figure VII-1 vary across different types of units and different patterns of post-military employment? For example, the performance of aviation units whose pilots flew for commercial airlines while in Extended Leave/Individual Ready Reserve (EL/IRR) status might far surpass that of, say, infantry units whose members took jobs in the civilian economy not at all analogous to their roles in the Service. It is plausible that the former units would more quickly recover the effectiveness levels that they had attained when last in Ready status. However, it is not clear how much more quickly they would do so, or what percentage of peak performance each unit could recover in the course of refresher training.

B. UCM IMPLEMENTATION ISSUES

1. Test-Bed Issues

What is the minimum-sized unit required to fairly test all aspects of the UCM? Can a test be conducted at the unit level or must an entire base or installation be involved? If certain aspects of the UCM can be tested on a small scale while others have to be tested on a broader scale, what is the mapping between particular UCM policy options, on one hand, and the necessary size of the test-bed unit (or installation or group of installations), on the other?

2. Issues in Personalizing Personnel Management

What are the obstacles to decentralizing authority for such personnel management functions as promotion and assignment, and how might the Services overcome them? How might the Services assure equity in managing individual careers across an entire Service? According to some reports on the Army's COHORT program, many NCOs judged that service in a COHORT unit might lessen their chances for promotion, and the program suffered accordingly. This kind of concern needs to be anticipated and fixed beforehand. Hence another and broader question: What might be the worries of officers and men if the Service decided to adopt UCM policies, and what options should be considered to respond to such concerns?

What are the advantages and disadvantages of regional recruiting for combat units? Suppose that we do not permit members of the same small community to serve in the same unit, so as to avoid repetition of World War I experiences in which all of a town's military-aged men might became casualties in a single battle. What advantages to regional recruiting remain?

3. Stocks and Flows Issues

What must the Services do to phase in Standby units in such a way that they achieve desired proportions of personnel at each experience level not only initially but also as the units "age" through the proposed cycle? What must they do to ensure the desired skills mix in all units across the Service? How would they have to change promotion and pay policies to, on one hand, avoid morale problems and to, on the other, avoid re-introduction of an individual replacement system in the guise of promotion equity for individuals? What can we learn from personnel systems like that of the British Army, in which soldiers remain in the same rank for longer periods than have been characteristic in post-WW II U.S. experience?

4. Lessons of the Past

What are appropriate lessons to learn from the history of previous attempts to implement partly similar policies (e.g., the Marine Corps experience with unit rotation, the Army's COHORT program)?

5. Personnel Proportions for Standby Units

Our discussions of options for the specific Services assumed particular proportions of EL/IRR, retired, and double-hatted active duty personnel in Standby units, and used those proportions in estimating the costs of such units. These proportions might well have to be revised based on experience or research along the lines just discussed. Consider, for example, the difference between maintenance personnel who have been retired for several years and maintenance personnel who left active service more recently but after only a relatively short period of active service. The Services might find that, owing to their long experience, the former group can more quickly come back up-to-speed. If so, they might want to reduce reliance on EL/IRR personnel and increase reliance on retirees for some Standby units.

C. COST ISSUES

1. Infrastructure/Overhead Savings

The cost figures supplied in the previous chapters reflect rough estimates about infrastructure and overhead costs that would be avoided as Military Personnel (MilPers) and Operations and Maintenance (O&M) costs fell due to UCM implementation. These estimates are necessarily rough because we have no experience with changes of the sort implied by widespread adoption of the UCM. Since World War II, DoD has seen periods in which its budgets declined. However, it's far from clear that the end-strength changes that occurred in those periods are a good model for the fundamental changes in personnel systems and career patterns that are implied by the UCM. Similarly, it's not at all clear that the changed demands on infrastructure and support that occurred in previous periods of reduced operating tempo provide the best basis for estimating how the UCM would change infrastructure demands. Fundamental change of the sort we propose for the Services creates the opportunity for changed ways of doing business in DoD's infrastructure; cost implications bear further examination.

2. Personnel Proportions and Cost Effectiveness

Even if we knew answers to the questions posed above concerning the most-effective personnel proportions for Standby units, questions about cost-effectiveness would remain. For example, what mix of double-hatted active, EL/IRR, and retired personnel would prove most cost-effective for different kinds of Standby units?

3. Cost and Readiness Relationships

Our analysis asserts that certain levels of readiness are consistent with certain levels of peacetime spending. For example, we estimate that a ground forces Standby 1 unit (a) can be ready to fight in just a few weeks and (b) will cost 5 percent of the MilPers and O&M costs of a fully manned unit in the current system. Estimate (a) reflects our judgment that long periods of training together will produce levels of unit skill so high that the units in question will be quite proficient even after as much as a year in Standby 1 status. Estimate (b) reflects the assumption that--apart from aviation units and ships--a unit's O&M costs would fall drastically once it was operated as we propose for Standby 1 status. Both (a) and (b) seem reasonable, when taken alone and considered to apply to the "typical" unit.

However, it may be that estimates (a) and (b) should be modified when taken together and applied to particular kinds of units. For example, it may be that, in order to

have their equipment ready to go when a unit completes enough refresher training to regain combat readiness, DoD would have to spend more (or less) than 5 percent of current O&M budgets. Similarly, it is plausible that the level of required O&M spending could vary by the kind of equipment that a unit is assigned and the generation of technology that it embodies.

4. Transition Cost Issues

What costs would the Services incur in the course of transition to a UCM regime? For example, what would they have to pay to store and maintain various categories of equipment for Standby units? Some of these storage costs might be paid already, through the funding of POMCUS and Maritime Prepositioned equipment; what other costs should we expect?

Another transition issue concerns the transition from peace to war. What would be the relation between maintenance/storage spending and the lead-time required to make the equipment fully ready for war? We have made some preliminary judgments about such issues in applying UCM principles to the different Services. (For example, we propose associating Standby aircraft units with ones in Ready status because of a judgment that it would be cost-effective to use active-duty personnel to maintain and fly the Standby unit's planes on a regular basis.) The point of research into this topic would be to provide the basis on which the Services could make more informed judgments about the payoffs to investments in maintenance/storage spending (and related MilPers costs).

D. NATIONAL GUARD/SELECTED RESERVE ISSUES

We suggested earlier that Selected Reserve units or personnel might be used to fill out Standby units in the event of mobilization. We suggested that there were ways that personnel from the active component could augment Selected Reserve units, and we discussed the possibility of placing greater reliance on Selected Reserve or Guard units to perform functions for which there are close civilian analogs. These ideas need further exploration. For example, what kinds of Standby units can most readily make use of Selected Reserve and/or Guard augmentation? On the other hand, if greater reliance is to be placed on the Selected Reserve, we need to study the potential that active component personnel have for enhancing the capability of Selected Reserve units.

Several functions now performed by active-duty military units have clear analogs in the civil sector. Military police perform functions for which State Troopers are appropriately trained. Some military communications units perform functions that resemble

the work of phone company employees. Military medical personnel perform many of the same functions as civilian surgeons and public health personnel. State Highway Departments have both people and equipment that could perform some engineering duties. Further research can illuminate the degree to which current policies would have to change to permit Selected Reserve units to recruit civilians in such sectors and to give them credit for their civilian training and experience. Research might also surface unorthodox ways of using civil resources. (For example, it might be possible for the Federal Government to pay part of the cost of State highway equipment with the understanding that the equipment would be made available to the military upon mobilization.) Finally, research could estimate the kinds of costs and benefits that would accompany these alternatives.

APPENDIX A

SIMULATION MODEL: OVERVIEW AND RESULTS

SIMULATION MODEL: OVERVIEW AND RESULTS

This appendix provides an overview of the Unit Personnel Tracking Model (UPTM) and reports some results from running the model.

The UPTM is a time-step, aggregated simulation of the organization of personnel in units, the movement of personnel into the Extended Leave/Individual Ready Reserve (EL/IRR) status, and retirement, and the resulting strength of units. For each unit, the UPTM computes what we term the "Familiarity Index" (FI), the average number of years each pair of persons in a unit have trained together summed over all such pairs. We believe that a unit's combat effectiveness would increase as its FI increased, but available evidence does not permit more than judgmental specification of the function that relates the two. FI is updated throughout the simulation to reflect changes in unit composition.

We use the UPTM to simulate two personnel and organizational systems: the combat-unit variant of the Unit Cohesion Model (UCM), which attempts to keep groups of personnel together as much as possible, and the Current System, which represents typical armed services practices today. We explain differences in how the UPTM simulates these systems throughout this appendix.

This appendix is structured as follows. Section A explains how the model treats time, units, personnel, and the FI. Section B describes the major computations that the model makes in terms of its FORTRAN subroutines. We refer, in brackets, to the FORTRAN subroutine names and input variable names; we also describe various parameters and provide, in parentheses, the values we used for those parameters in producing the results reported below. Section C describes model results.

Appendix B provides additional detail about the UPTM.

A. BASIC CONCEPTS AND STRUCTURES

1. Flow of Time

The UPTM is a time-step model. After some initialization, the model performs the same series of steps each year. Section B, below, provides an overview of these steps; Section A of Appendix C discusses them in greater detail.

2. Resources and Their Flows

a. Units

One key UPTM resource is the "unit," which can be visualized as a battalion-sized group of personnel. The current version depicts only one type of unit. As described below, personnel are separated into "junior" and "senior" ranks. Input variables specify the desired total number of personnel in a unit (1,000, for the results reported below) and the desired number of senior personnel (300) in a unit.

When the UPTM simulates the UCM, each unit spends an input number of years (3) in Ready status, then an input number of years (1) in Standby 1 status, and, finally, an input number of years (4) in Standby 2 status. After that, the unit is disbanded; that is, its active-duty personnel become available to form part of a new unit. In addition, a unit that has just ended its year in Standby 1 status can split off a part of its active duty personnel to form part of a new unit. The model attempts to maintain an input number [NRUD] of Ready units (6), and forms new units as necessary to reach this number (subject to certain restrictions, as described below). Newly trained personnel are brought in as necessary to staff new units, and the number of such personnel needed is recorded as one of the outputs of the model.

When the UPTM is run to simulate the current system, each unit is considered to have an essentially infinite lifetime, and to be fully manned with active-duty personnel all the time. However, personnel turnover occurs in the unit as personnel leave active duty and are replaced with newly trained personnel. Additional turnover can be modeled [Subroutine TRNOVR]. An input variable [NBFE] specifies the number of units (12).

For each unit, the model keeps track of the Familiarity Index. It computes an initial value of FI when the unit forms, based on the lengths of time that each pair of individuals that are coming into the unit have served together previously. As changes to

the unit occur, such as additional training or movement of personnel, the model recomputes that unit's FI.

b. Personnel

The UPTM keeps track of the numbers of personnel in various categories:

- Active duty, Extended Leave/Individual Ready Reserves (EL/IRR), and retired;
- Associated with units or not associated with units (i.e., in "free pools");
- Year and term (for active duty personnel);
- Number of years of obligation left (for EL/IRR and retired personnel);
- Rank class (first-term active duty personnel are considered to be junior, others to be senior).

Active duty personnel can serve up to an input number (5) of terms [NTERM]; each term has an input number (4) of years [NTPTM]. (It would not be difficult to let the number of time periods in a term depend on the term). At the end of each year, an input fraction of the active duty personnel that have reached the end of year I of term J go into EL/IRR status. (This fraction can depend on I and J and might well be zero except at the end of a term. One minus this fraction can be thought of as a reenlistment rate.) Active duty personnel reaching the end of time period NTPTM of term NTPTM retire. (There are exceptions to this; see the description of Subroutine UPRS in Section A of Appendix B.)

When people leave active service to enter Extended Leave/Individual Ready Reserve (EL/IRR) status, or to retire, they have an input number of years of obligation left (4). EL/IRR or retired personnel have their number of years of obligation reduced (by 1) at the end of each time period; when they complete their military service obligation, the model does not consider them further.

When the UPTM is run to simulate the UCM, a person who has been associated with a unit at the time he enters EL/IRR status or retirement remains associated with that unit for the remaining life of the unit or his remaining obligation, whichever is shorter. Otherwise, he enters an inactive duty "free pool" of EL/IRR or retired personnel (see the description of Subroutine UPRS). In simulating the Current System, all personnel entering the IRR or retirement go to inactive-duty free pools. The numbers of personnel in

free pools are tracked and output; in future versions of the UPTM, they might be used to staff Call-Up units.

The UPTM simulates peacetime attrition for all categories of personnel. At certain points in a unit's lifetime, replacements for attrition can be added to a unit. (See the discussion of Subroutine DPGONE in Appendix B.)

3. The Familiarity Index

A primary output of the model is the "familiarity index" (FI), which represents the average number of years each pair of people in a unit have trained together (either in the present unit or in units where they served together previously), summed over all such pairs. As stated above, we believe FI is positively related to both unit cohesion and combat effectiveness.

A unit might have active duty, EI/IRR, and retired personnel associated with it. Therefore, the UPTM regards the Familiarity Index as a vector. Separate components of this vector indicate (a) the average number of years that pairs of active duty, EL/IRR, or retired personnel assigned to a unit have trained together and (b) the corresponding number for pairs consisting of an active duty person and an EL/IRR person, an active duty person and retired person, and an EL/IRR person and a retired person. The UPTM computes and tracks an overall Familiarity Index, a weighted average of these components, for each unit. In these computations, only time served together full-time (i.e., in Ready units in the UCM and in all Current System units) counts. If a pair of individuals spend a year on the rolls of the same Standby unit, in other words, that year does not increase the "time served together" accorded to that pair.

The Familiarity Index is updated as personnel get more training, as people move into EI/IRR status or retirement, and as units form, break up, and reconfigure. Rather than keep track of every pair of persons, the model uses a variety of weighted averaging techniques to determine (approximate) familiarities. The idea behind one such weighted averaging technique is shown in Table A-1, which depicts a situation in which two groups of personnel are to combine into one group (assume for simplicity that these are all active duty personnel). The model has kept track of the average familiarities, M_1 and M_2, of the pairs of personnel in groups X and Y, respectively. It is assumed that a person in group X and a person in group Y have, on average, known and trained together for some number, P, time periods. (In this kind of situation, the quantity P is often specified as an input to the model; zero might well be an appropriate value for it.) The average

familiarity of pairs of personnel in the combined group is computed as shown in Table A-1. This resultant quantity will be used as the Familiarity Index of the combined group.

Another type of averaging procedure is used when a subset of personnel is extracted from a group (e.g., for reassignment elsewhere). The model has kept track of the Familiarity Index of the full group. The model calculates an FI for the subset from the full group's FI, the years of service of the personnel in the subset, and the years of service of the personnel remaining in the group. This calculation is based on the assumption that the familiarity of a person with i years of service and a person with j years of service is proportional to the minimum of i and j. Although admittedly an approximation, this assumption is a way of avoiding the necessity of tracking every pair of personnel. (Further refinements of this procedure are necessary to treat separately the active duty, IRR, and retired personnel in the various groups, i.e., to compute all relevant components of the FI vector. The FI of the remainder of the group, i.e., the personnel not in the subset, also must be recomputed.)

Table A-1. Computing the Familiarity Index for Two Units Combined into One

(a) Example Data and Symbols

Units	Number of People	Number of Pairs	Unit Familiarity Index
X	n_1	$n_1(n_1-1)/2$	M_1
Y	n_2	$n_2(n_2-1)/2$	M_2
X and Y	$n_1 + n_2$	$n_1 n_2$	P

(b) Key Formulas

Total Number of Pairs	$(n_1+n_2)(n_1+n_2-1)/2$
P = Familiarity Index for X and Y Combined	$\dfrac{[M_1 n_1(n_1-1)/2 + M_2 n_2(n_2-1)/2 + P n_1 n_2]}{(n_1+n_2)(n_1+n_2-1)/2}$

The FI is updated as personnel get more training, as people move to the IRR or retire, and as units form, dismantle, and reconfigure. An initial value of the FI (all relevant components of the vector) must be specified in the input data file for each unit

initially present. Experience to date indicates that the long-run behavior of the model does not seem to be sensitive to these initial values.

4. Inputs and Outputs

The model has approximately 40 input variables, but some of them are arrays, so users can specify up to several hundred data values. These values specify an initial set of units, their personnel strengths, and an initial familiarity value. Section D defines and gives sample values for the input variables. Optionally, the model can read a file of definitions of the input variables.

The UPTM produces several files of output, including:

- A summary output file, which gives unit statuses and Familiarity Indices;
- A file showing total numbers of junior and senior personnel, and the percentage distribution of senior personnel by term;
- A detailed file of model results-inputs to control how much output is written;
- A file showing input data values and (optionally) variable definitions;
- A file of warning messages, if any;
- Temporary files relating to mid-run data value changes.

B. MODEL OPERATION

This section describes UPTM interactions by discussing the main program and the major subroutines, i.e., those called directly by the main program. Appendix B contains a list of all subroutines and other subprograms of the model.

1. The Main Program

The main program has an initialization section, a main loop that iterates over time periods, and an ending section. The main program starts by setting up some output files. Then, it calls Subroutine INP to read the inputs. (Appendix B defines and gives sample values for the input variables.) The input data appear on the output data file. A variable or array element is given the value zero if no value is specified for it on the input data file.[1]

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[1] In addition to initial values of inputs, the value of an input can be changed in mid-run by Subroutine TIMET; see Appendix B. These changes, if desired, are also specified on the input data file.

After the inputs have been read, Program UPTM calls Subroutine INITLZ to initialize certain working variables. Then, the program loops over each time period. The number of time periods simulated is an input; we ran this model for 25 time periods so that it reached "steady state" values; these values (from years 13 through 25) are displayed in the results depicted below. For each time period, the program calls a sequence of subroutines, each of which models a different interaction pertinent to the personnel and unit structure. The sequences for simulating the UCM differ from those for simulating the Current System.

2. Simulation of the UCM

The main program simulates the UCM in the following sequence:

- Call Subroutine TIMET to process updates to input variables, if any.
- Call Subroutine DPGONE to determine numbers of personnel who leave permanently (e.g., people that die or that the Service discharges as unfit), to update unit strength appropriately, and to compute desired number of replacements.
- Call Subroutine CMPEFF to determine and output the overall effectiveness measures, including the number of units formed and the Familiarity Index for these units. This routine also adds in replacements for losses and recomputes effectiveness measures appropriately. In producing the results below, replacements joined units half-way through those units' period in Ready status. The number of replacements provided was twice the number lost via peacetime attrition since that unit entered Ready status.
- Call Subroutine UPRS to update the term numbers and year numbers of personnel; determine numbers of personnel who go on Extended Leave or into the IRR or retirement; update the remaining military service obligation of personnel already in EL/IRR status or retirement.
- Call Subroutine UPUNIT to update each units "age," to dismantle units that have served their final year in Standby 2 status, and to free up certain personnel in units that have just finished their Standby 1 year.
- Call Subroutine FMUNIT to form new units, using active duty personnel taken from units that have reached the end of their Standby 1 year, newly trained people, people from the free pools and/or people from dismantled Standby 2 units. The routine can dismantle Standby 2 units prior to the time that they are normally disbanded. It would do so if the number of Senior people assigned to the supporting establishment and not to a unit in Standby

or Call-Up status was too small to provide the number needed for newly-forming Ready units.

3. Simulation of the Current System

The main program simulates the Current System in the following sequence:

- Call Subroutine TIMET to process updates to input variables, if any.
- Call Subroutine DPGONE to determine numbers of personnel who leave permanently, to update unit strength appropriately, and to compute the desired number of replacements. In keeping with the present Service practice of individual replacement, this routine attempts to replace all losses as they occur.
- Call Subroutine CMPEFF to determine and output the overall effectiveness measures, including the number of units formed and the Familiarity Index for these units. This routine also adds in replacements for losses and recomputes effectiveness measures appropriately.
- Call Subroutine TRNOVR to model turnover in units.
- Call Subroutine UPRS to update the term numbers and year numbers of personnel; determine numbers of personnel who go into the IRR or retirement; update the remaining military service obligation of personnel already in EL/IRR status or retirement (free pools only).
- Call Subroutine UPUNIT to update age of unit (all units stay fully manned at all times, and to that extent are comparable to UCM units in Ready status).
- Call Subroutine DELSEN to transfer Senior personnel in excess of input levels (30 percent) to the active duty free pools.
- Call Subroutine REFLUN to fill personnel shortfalls in units (via new recruits if necessary).

All of these subroutines are discussed further in Appendix B.

After the desired number of time periods have been simulated, the UPTM provides a one-page "executive summary" table of average unit strengths and familiarities.

C. MODEL RESULTS

This section provides an overview of UPTM results from simulating the Current System and the UCM.

1. Numbers of Units and Unit Strengths

The figures and tables in this section depict results from UPTM runs for which one objective was to produce 12 readily mobilizable units. For the Current System, the simulation accordingly produced 12 units with 1000 full-time personnel at all times. For the UCM, input values were set that required the UPTM to produce 6 Ready units and, if possible, 6 Standby units.

Table A-2 compares the number and strength of units producible under the current system and under the UCM. It performs these comparisons for 9 different combinations of the first-term re-enlistment rate and annual peacetime attrition of first-term personnel. Table A-2 shows that the UCM cannot produce 12 readily mobilizable units when only 25 percent of first-term personnel re-enlist. This result holds whether washouts and other losses of first-term personnel are as low as 5 percent per year, or as high as 20 percent. It reflects the fact that 25 percent is too low a re-enlistment rate to provide the senior personnel needed to staff newly-forming Ready units.

Table A-2 also shows that, given 50 percent first-term re-enlistment the UCM can produce something more than 12 readily mobilizable units, and that those units are fairly close to the desired strength of 1000 personnel apiece. (We obtained the figures in the Standby 2 rows by dividing the number of personnel assigned to Standby 2 units by 1000. In all cases, the model formed a larger number of below-strength Standby 2 units.)

Table A-2 shows, further, that the UCM would also produce 12 readily-mobilize units if 75 percent of first-term personnel were to re-enlist. This result holds across the range of first-term attrition values we investigated.

In the form used to produce the results reported here, the UPTM (a) embodies routines that dismantle Standby 2 units if necessary to get the Senior personnel needed to staff newly forming Ready units, and (b) accords top priority to forming six Ready units, second priority to forming two Standby 1 units, and lowest priority to forming as many Standby 2 units as possible.

2. Recruiting Requirements

Figure A-1 depicts the number of recruits required to maintain the number and strength of the units depicted in Table A-2. What it shows is not surprising: (a) the

Table A-2. Current System vs. UCM Comparison: Number and Strength of Readily Mobilizable Units

a) 5% Annual First-Term Peacetime Attrition

Assumed First-Term Reenlistment Rate	Number of Units (Unit Strength)				
	Current System[a]	Unit Cohesion Model			
		Ready	Standby 1	Standby 2	Total
0.25	12 (1000)	6 (996)	2 (971)	1.6 (1000)	9.6
0.50	12 (1000)	6 (999)	2 (975)	4.5 (1000)	12.5
0.75	12 (1000)	6 (999)	2 (975)	4.5 (1000)	12.5

b) 10% Annual First-Term Peacetime Attrition

Assumed First-Term Reenlistment Rate	Number of Units (Unit Strength)				
	Current System[a]	Unit Cohesion Model			
		Ready	Standby 1	Standby 2	Total
0.25	12 (1000)	6 (997)	2 (957)	1.0 (1000)	9.0
0.50	12 (1000)	6 (998)	2 (959)	4.7 (1000)	12.7
0.75	12 (1000)	6 (998)	2 (958)	4.7 (1000)	12.7

c) 20% Annual First-Term Peacetime Attrition

Assumed First-Term Reenlistment Rate	Number of Units (Unit Strength)				
	Current System[a]	Unit Cohesion Model			
		Ready	Standby 1	Standby 2	Total
0.25	12 (1000)	6 (990)	2 (895)	0.2 (1000)	8.2
0.50	12 (1000)	6 (991)	2 (896)	4.3 (1000)	12.3
0.75	12 (1000)	6 (991)	2 (896)	4.3 (1000)	12.3

[a] All units are full time and at full strength.

Current System force of 12 full-strength and full-time battalions requires roughly twice as many recruits as the UCM set of six full-strength and full-time battalions; (b) both systems require fewer recruits when first-term attrition is low and more when it is high.

The total numbers of required recruits displayed in Figure A-1 do not vary as a function of first-term re-enlistment rate. This version of the UPTM assumes that both newly forming UCM Ready units and full-strength Current System units have to have 70 percent Junior personnel. Thus, the rate at which those junior personnel decide to reenlist after 4 year's service does not affect the number of new recruits required.

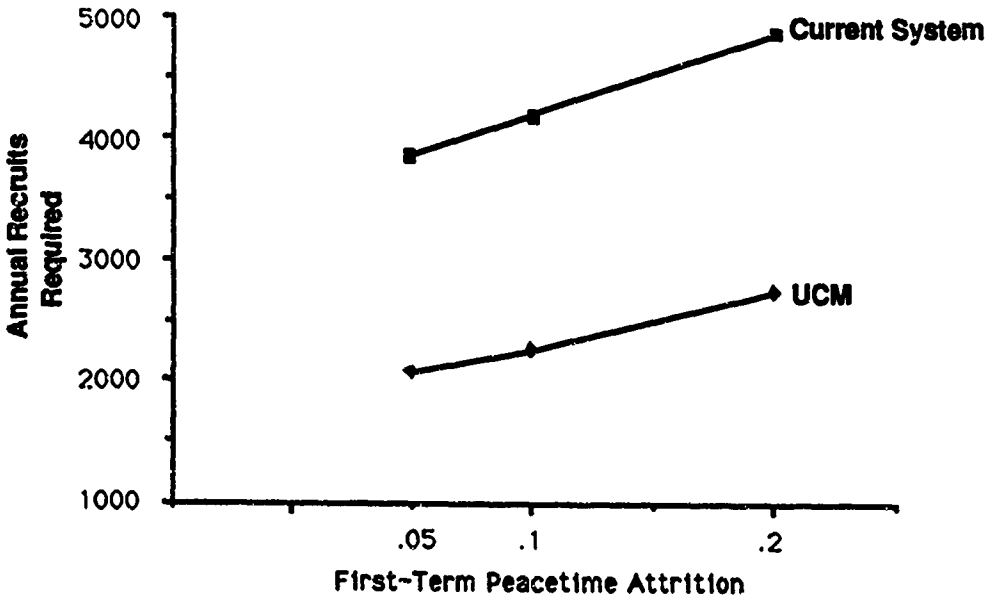

Figure A-1. Recruit Requirement Comparison: Current System VS UCM

3. Familiarity Comparisons

Figure A-2 shows how the Familiarity Index varies over time for both Current System and UCM units. It also depicts the contrast between the familiarity levels achieved by both systems. In particular, it shows that the lowest FI levels achieved by UCM units are roughly double the highest FI levels achieved by units in the Current System.

4. Distribution of Senior Personnel

Figure A-3 breaks down senior personnel (i.e., those who are past their first 4-year term of service) by term. It reflects the percentages of all active-duty senior personnel (i.e., both those assigned to units and those serving in the supporting establishment) in

their second, third, fourth, and fifth terms of service, respectively. The figure depicts percentages from years 13 through 25 of our UPTM runs. These years are the period over which we obtained the results reported here; during this period, the model produces "steady state" results that are not characterized by fluctuations arising from the initial conditions we specified.

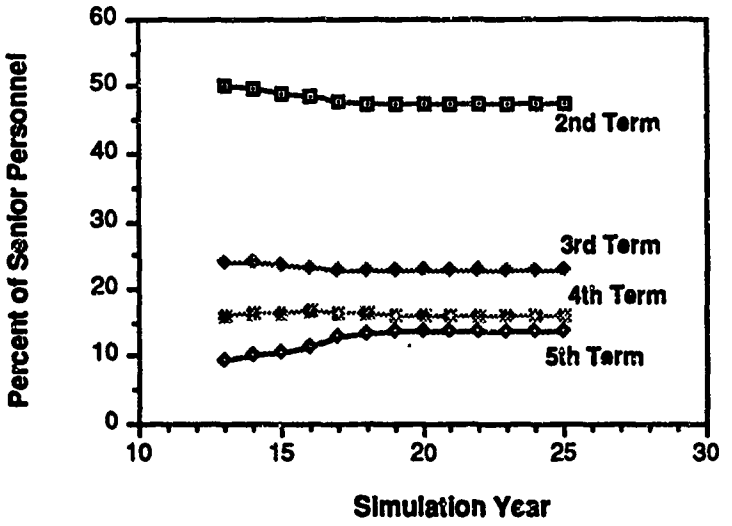

Figure A-3. Breakdown of Senior Personnel by Term of Service

Figure A-4 also breaks down senior personnel by term, but does so only for personnel in the unit categories described. It displays both the percentage fraction and the lowest percentage for all of the units in a given status in each year. In year 13, for example, six units are in Ready status. One of those units has 65 percent second-termers, which the highest percentage observable in all six units. Another unit has 61 percent of second-termers, which is the lowest percentage observable in all six units.

The percentages depicted in Figure A-4 are quite stable over time, as shown by the fairly flat appearance of the lines that connect the points depicting them. Note that this stability is not a result of measuring the same set of units from one year to the next. Of the six Ready units whose second-termer percentages are bounded by the values listed for year 13, for example, only four are in the set of Ready units whose values are bounded by the values listed for year 14: at the end of year 13, two of the six units that were in Ready status in year 13 moved into Standby 1 status.

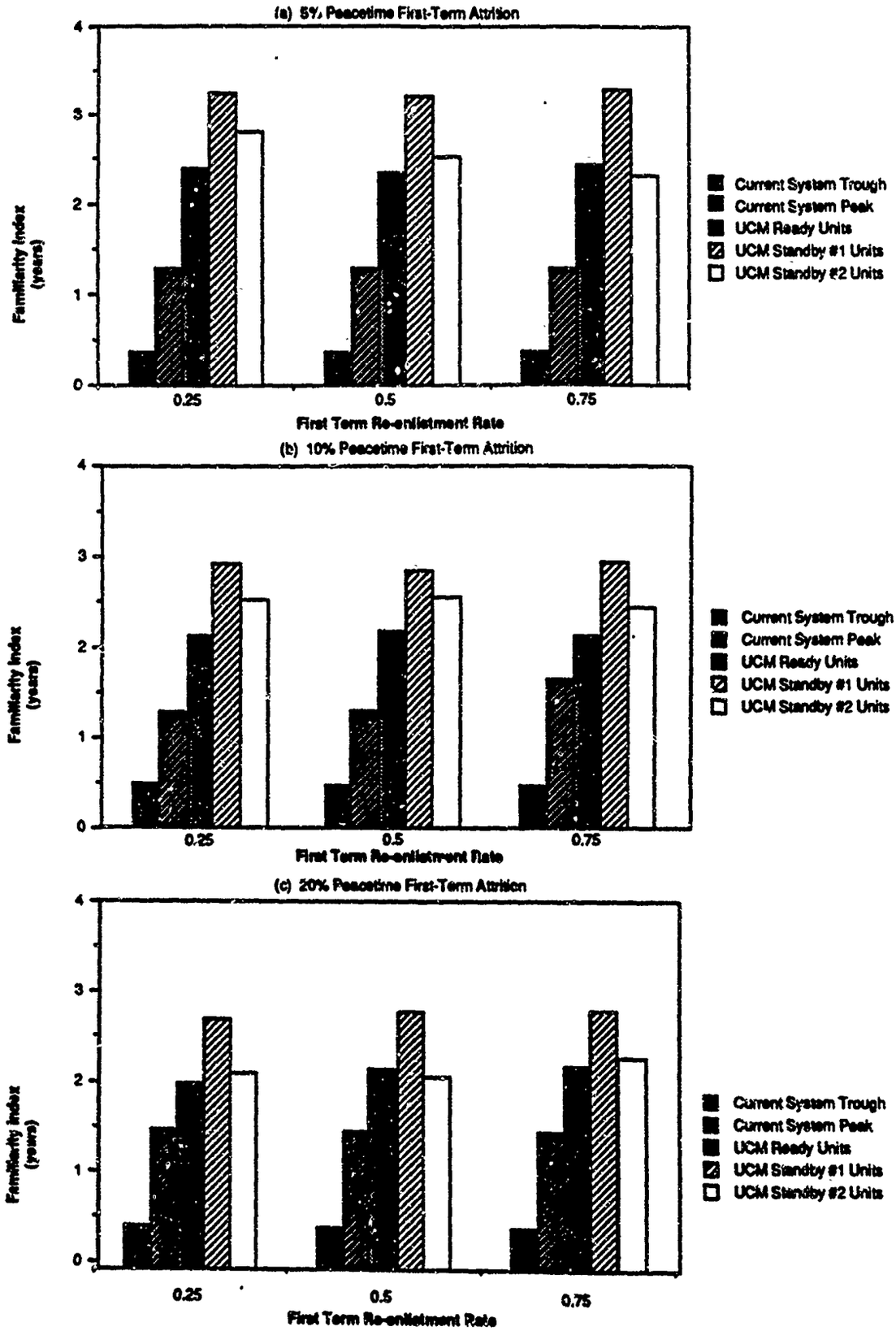

Figure A-2. UCM Familiarity vs Current System Familiarity

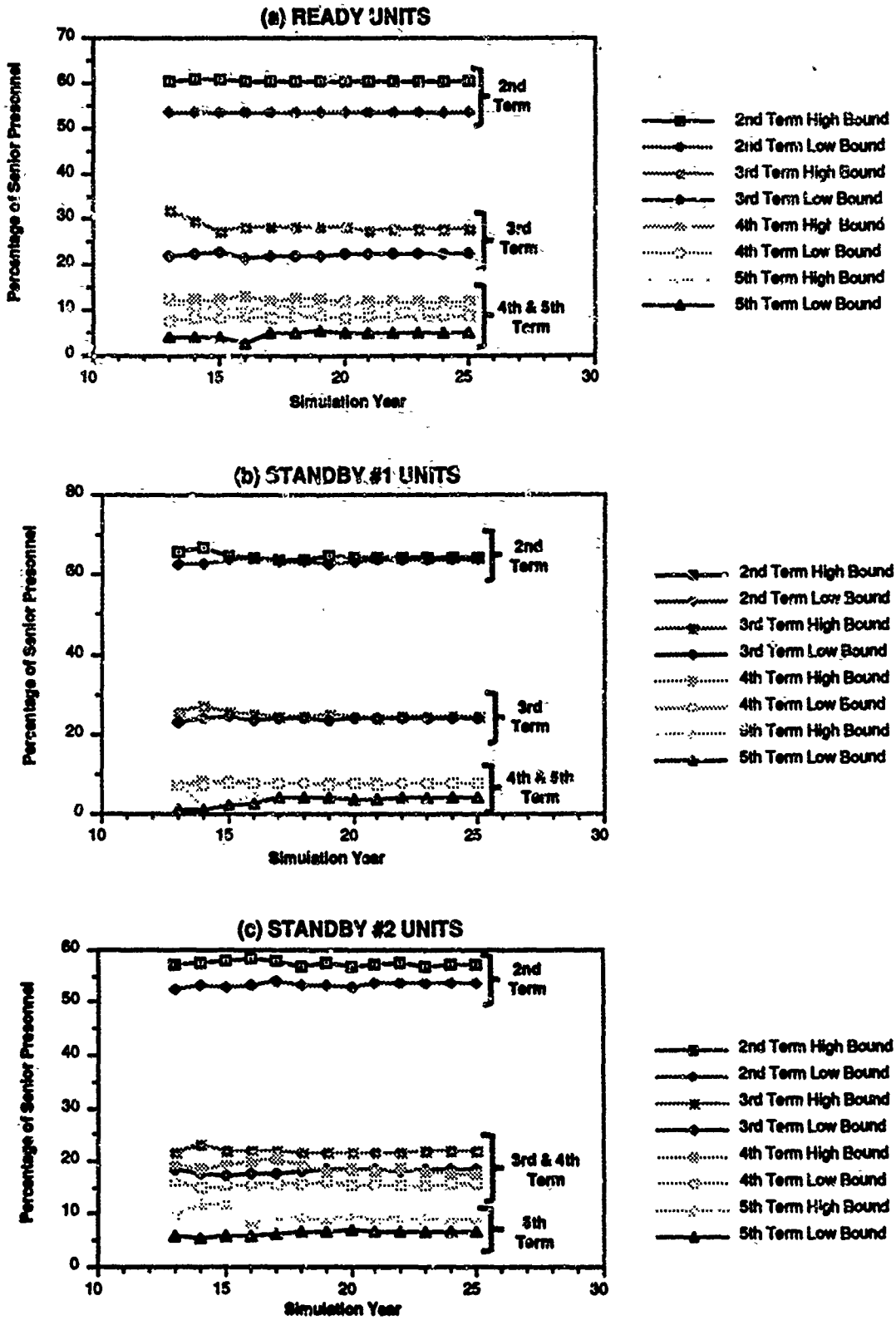

Figure A-4. Breakdown of Senior Personnel by Unit Type and Term of Service

APPENDIX B

SIMULATION MODEL:

DETAILS ON SUBROUTINES, INPUT VARIABLES, AND DATA VALUES USED TO PRODUCE RESULTS

SIMULATION MODEL: DETAILS ON SUBROUTINES, INPUT VARIABLES, AND DATA VALUES USED TO PRODUCE RESULTS

A. INTRODUCTION AND STRUCTURE

This appendix supplements Appendix A's discussion of the Unit Personnel Tracking Model (UPTM) and provides technical detail likely to be of interest to modelers.

This appendix is divided into three sections. Section B parallels Appendix A's discussion of Model Operation, and provides a more detailed discussion of each subroutine in the model. For ease in exposition, each subsection is headed by the name of the subroutine and a statement of the phrase for which that name serves as mnemonic.

Section C lists input variables, provides definitions of them, and provides the data values that were used to produce the simulation results reported in Chapter 1 and detailed in Appendix A.

Section D provides brief descriptions of all the UPTM's subroutines, in alphabetical order.

B. DETAILED DESCRIPTION OF SUBROUTINES

SUBROUTINE TIMET ("time t [non-initial input value]")

Subroutine TIMET can update the value of an input variable or array element, at the beginning of any desired time period in the simulation. The new value and time period are specified in the file of inputs that is read at the beginning of the program. The updates are written onto a temporary file, and are read from that file and applied by Subroutine TIMET at the beginning of the appropriate time period. A change to the variables specifying the sizes of the free pools of personnel is treated as an increment to the current value of the variable. For other variables, a change is treated as a replacement of the current value.

Although any variable can be changed by TIMET, for maximum consistency of results, many variables should not be. One set of variables for which mid-run changes

might be desirable are the printout control variables (those with names beginning with "IRWT"). By manipulation of these variables, the user can obtain (the long and space-consuming) detailed printout for only those time periods of special interest. The "effectiveness" variables, including reenlistment rates, fractions of personnel that become losses, and fractions of personnel reassigned from a unit ending Standby 1 status, could also be changed in mid-run without causing gross inconsistency in the model's output. The "limit" variables (those beginning with the letter N) and the variables specifying the current numbers of personnel in units should not be changed by TIMET.

SUBROUTINE DPGONE ("determine personnel gone")

Subroutine DPGONE determines numbers of personnel who leave permanently (attrition). At appropriate times, the routine computes desired and/or numbers of replacements for these personnel. The replacements are not added in until Subroutine CMPEFF, however. The subroutine is used in simulating both the UCM and the Current System, but the details differ between the two scenarios.

The various elements of the array input FPG (as shown in Section C) are multiplied by the numbers of personnel in the appropriate categories to determine losses for the time period. The subroutine starts by computing losses in the active duty, IRR, and retired free pools, and subtracting these losses from the pools.

Next, the steps described below we performed for each unit in turn. Losses are determined by multiplying the appropriate elements of FPG by the numbers of active duty, IRR, and retired personnel in the unit (ready units have active duty personnel only). Losses are subtracted out. The loss rates for Junior and Senior personnel can be different, and this might affect the Familiarity Index (FI) (disproportionately more or fewer older, hence more familiar, people leave). Accordingly, Subroutine DPGONE recomputes the FI of the reduced unit, for units in Ready status. (This computation is not performed for units in Standby status, which have mostly Senior personnel.)

The next step is to (re)compute the desired number of replacements for the unit. Replacements are accounted for by rank class (Junior or Senior). In simulating the Current System, the desired number of replacements (in a given rank class) equals the personnel losses (in that rank class) just computed: the UPTM will attempt to replace all of them during the current time period. In the simulating the UCM, losses in Standby units are not replaced, and losses in Ready units are replaced only at specified times while the unit is in Ready status.

To understand the mechanics, consider a Ready unit during a UCM simulation. The desired numbers of replacements (by rank class) are stored in a working variable (array), which is initialized to zero when the unit is formed. If replacements are not to enter during this time period, then the numbers of personnel lost this time period are added to this working variable. If replacements are to enter at a time that is fraction f through the current time period, the fraction f of losses this time period is added to the working variable.

If replacements are to enter the unit this time period, then the subroutine computes actual numbers of replacements. The desired number of replacements can be multiplied by an input (variable ANPAT) to anticipate future losses. Senior replacements are taken from the active duty free pool; if the number of seniors in the free pool is insufficient, a warning message is printed. Junior replacements are taken first from the free pool, if available, or else from newly trained people. The number of recruits required to yield the desired number of newly trained people is computed and added to a cumulative total, which is one of the outputs of the model. (The input FPG(1) represents the fraction of new recruits who do not get through their training year, so to have y newly trained people available at a certain time, y/(1-FPG(1)) recruits must enter training at least a year before then. All newly trained people are considered to be in the second year of their first term.)

The entry of replacements affects the FI unit's, but recomputation of FI--and the actual addition of the number of replacements to the unit totals--are delayed until Subroutine CMPEFF. In simulating the UCM, the number of desired replacements (for a Ready unit) is reinitialized. Various quantities of interest can be written on the detailed output if the input IWRTPG equals unity or greater.

SUBROUTINE CMPEFF ("compute effectiveness")

Subroutine CMPEFF updates the FI of each unit to reflect the additional training that has occurred during the current time period. The subroutine should be thought of as occurring just before the end of the time period. Each unit is considered separately.

Units in Standby 1 status receive no additional training. Since the numbers of active duty, IRR, and retired personnel might have changed due to losses, Subroutine SMPRSU and Function COVFTM are called to recompute the personnel totals and overall familiarity training measure.

Units in Standby 2 status receive an input amount (e.g., two or three weeks) of additional training (see the variables RTIRR, RTRET, and RTSBU, in Section B). The various components of the Familiarity Index vector are incremented by the additional training time. As with Standby 1 units, Subroutine SMPRSU and Function COVFTM are called to recompute the personnel totals and the overall Familiarity Index.

Personnel in a Ready unit (who are all active duty) receive one additional time period of training; replacements joining that Ready unit do not. In simulating the Current System, replacements are considered to have, on average, half a time period of additional training. In simulating the UCM, if replacements entered at a point that was fraction f through the current time period, they receive (1-f) of a time period of additional training. Note that there might be as many as three distinct groups of replacements: Senior personnel from the free pools, Junior personnel from the free pools, and newly trained personnel. The inputs BFRPRP, BFRPU, and BTNRL are applied here; they can specify certain baseline familiarities between the groups of replacements and the personnel that were in the unit. The replacements are added to the unit, and Subroutine CMPFTM is called to recompute the Familiarity Index based on the additional training times and intergroup familiarities. Subroutine SMPRSU and Function COVFTM are called to recompute the personnel totals and overall Familiarity Index. (COVFTM is redundant here, as the unit has only active duty personnel.)

Subroutine CMPEFF also updates some cumulative totals relating to numbers of personnel, numbers of units, and familiarity of units. The final values of these quantities will be used in computing the overall average measures printed out at the end of the simulation. A list of current units (and their strength, FI, etc.) is written on the summary output; additional detailed output can be written if desired.

SUBROUTINE TRNOVR ("turnover")

Subroutine TRNOVR models turnover in simulating the Current System. The number of personnel in each unit remains unchanged, but the units Familiarity Index is recomputed to reflect the replacement of an input fraction of the existing personnel by unfamiliar personnel. Each unit is treated separately; the description below applies to a single unit.

The routine first computes numbers of people (by year and term) who would leave the unit due to turnover, by multiplying the various elements of the input array FACTO (see

Section B) by the corresponding numbers of personnel in that year and term. (Set FACTO to all zeros to see the effect of no turnover.)

Updating the Familiarity Index involves several steps. First, Subroutine TRNOVR calls Subroutine UPREFC to compute the change in the FI when the personnel marked to leave the unit do so. The variables [PACDU] for numbers of personnel in the unit are never actually changed in Subroutine TRNOVR, but provisional variables, for the numbers of personnel that would be left in the unit, are computed. Subroutine UPREFC takes into account the differing years of service of the people who leave. Then, Subroutine TRNOVR calls Subroutine CMPFTM to recompute the unit's Familiarity Index given that an input number of people, equal to the number of people who left, join the reduced-sized unit. Here, CMPEFF uses the inputs BFRPRP and BFRPU, which most likely would be set to zero, to represent the average familiarity of the replacements with each other and with the unit. (Junior and Senior ranks are considered separately). The value of the FI computed by Subroutine CMPFTM is used as the new FI of the unit.

If the input variable IWRTUP has a value of 2 or greater, Subroutine TRNOVR prints some of its results on the detailed output.

SUBROUTINE UPRS ("update personnel")

Subroutine UPRS updates the term numbers and year numbers of personnel, determines numbers of personnel who go to the IRR or retire, and reduces the remaining obligation for personnel currently in the IRR or in retirement. For personnel in the free pools, these computations are performed by Subroutine UPRS itself; for personnel in units, the computations are performed by Subroutines UPRCA, UPRDY, UPRDSB, and/or UPRSB, which UPRS calls. For each unit, the Familiarity Index vector is updated appropriately.

After initializing some working variables, Subroutine UPRS updates the statuses of personnel in the free pools, as follows (these constructs are also used, with certain modifications, for personnel in units).

The first adjustment is to personnel currently in the IRR free pool and the retired free pool. Working arrays give the numbers of personnel in these two pools; both arrays have a dimension on years of obligation. Subroutine UPRS updates these obligations. IRR and retired personnel who had one time period of obligation left are now removed from the model (they have completed their period of obligation). Personnel who had i time

periods of obligation left now have i-1 (where i ranges from 2 through the length of the obligation period).

For personnel in the active duty free pool, years and terms are updated. All personnel that have just completed time period NTPTM of term NTERM (these are input variables) go to the retired free pool, with (the input) NOBLRT time periods of obligation. Of the personnel who have just completed time period I of term J (except for I=NPTPM and J=NTERM), the input fraction FACIR(I,J) go to the IRR free pool. (It might frequently be the case that FACIR(I,J) is zero unless I=NTERM, i.e., personnel make a reenlistment decision only at the end of a term. In this case, 1-FACIR(NTPTM,J) can be regarded as the term-J reenlistment rate. However, the model can accept a different value of FACIR for each (I,J) combination.) The obligation upon joining the IRR is (the input) NOBLIR time periods. The model keeps track of rank upon joining the IRR. Personnel who have served at least one active duty term upon joining the IRR enter the rank 2 IRR free pool; others, the rank 1 IRR free pool. (Since the numbers of personnel in the IRR and retired free pools are currently simply reported, not used further by the model, this ranking scheme does not affect any other part of the model.)

For personnel in the active duty free pool who do not go to the IRR or retirement, the year and term are updated, in the obvious manner. Personnel who have completed time period I of term J enter time period I+1 of term J, unless I = NTPTM, in which case they enter time period 1 of term J+1. The corresponding status variables are updated to reflect these changes.

After Subroutine UPRS has updated the free pools, it loops over the units. The action taken depends on several factors. If the Current System is being simulated, Subroutine UPRS calls Subroutine UPRCA, for each unit. Under the Unit Cohesion Model, Subroutine UPRS calls various sequences of subroutines, depending on the unit's status:

If the unit is in ready status but has not completed its last ready time period (so it is not about to transition to standby 1 status) then Subroutine UPRDY is called;

If the unit has just completed its last time period of ready status (so that it is about to transition to standby 1 status) then Subroutine UPRDY is called and then Subroutine UPRDSB is called;

If the unit is in standby status, then Subroutine UPRSB is called.

The four bulleted subsections immediately below discuss these subroutines. Note that each subroutine deals with a single, given unit.

- **SUBROUTINE UPRCA ("update personnel--current army")**

In simulating the Current System, IRR and retired personnel are only in the free pools, not associated with units. A unit contains only active duty personnel. The years and terms of these personnel are updated as described above for the active duty free pools. The fractions FACIR are used. Personnel who go to the IRR or retirement leave the unit and go to the free pools, with rank and obligation determined as described above.

Since the personnel leaving the unit generally have a different years-of-service mix than those remaining, and since personnel with more years of service, on balance, have served for longer periods with other unit personnel, the overall Familiarity Index will likely change. Subroutine UPRCA calls Subroutine UPREFC to recompute FI, based on the relative years of service of the departers and remainers.

- **SUBROUTINE UPRDY ("update personnel--ready unit")**

In simulating the UCM, all personnel in a Ready unit are modeled as staying on active duty with the unit until that unit enters Standby status. The fractions FACIR are applied as described above, but are interpreted as fractions of personnel who will go to the IRR when the unit completes its ready period. Similarly, personnel completing time period NTPTM of term NTERM will retire when the unit completes its ready period. The numbers of such personnel are stored in certain working arrays. (Such personnel remain vulnerable to the active duty level of attrition in Subroutine DPGONE.) The years and terms of personnel not earmarked to enter the IRR or retirement are updated as described above.

Since no personnel are actually leaving the unit at this time, and all personnel in the unit remain on active duty (although some might leave at a future time), there is no need to update the Familiarity Index at this point. The value computed in Subroutine CMPEFF still is valid.

- **SUBROUTINE UPRDSB ("update personnel--ready to standby")**

Subroutine UPRDSB is used in UCM simulations and applies to a unit that has just completed its Ready period and is about to transition to Standby status. Subroutine UPRDY has computed numbers of personnel that will move to the IRR or retirement when the unit ends its Ready period. Subroutine UPRDSB actually transfers these numbers to the working arrays of IRR and retired personnel associated with the unit. All personnel

entering the IRR have NOBLIR time periods of obligation in the IRR (regardless of how much extra time they waited on active duty). Similarly, personnel entering retirement have NOBLRT time periods of obligation.

As indicated previously, the Familiarity Index is a vector; separate components indicate the average number of years training together for pairs of active duty personnel assigned to a unit, IRR personnel, retired personnel, pairs consisting of an active duty person and an IRR person, an active duty person and a retired person, and an IRR person and a retired person. While the unit was in Ready status, only the active duty component was relevant. (And under the Current System, only the active duty component is relevant.) Now, personnel, with varying numbers of years of service behind them, move from active duty to the IRR and from active duty to retirement. Subroutine UPRDSB calls Subroutine UPRSEF to recompute all components of the FI vector, taking into account the numbers and years of service of groups of moving personnel. Then, UPRDSB calls Subroutine SMPRSU and Function COVFTM to recompute the total numbers of personnel associated with the unit and to compute an overall Familiarity Index for the unit as a weighted average of the components.

- **SUBROUTINE UPRSB ("update personnel--standby unit")**

In simulating the UCM, a unit in Standby status might have some active duty, some IRR, and some retired personnel associated with it. All components of the familiarity vector are relevant in computing the Standby Unit's FI.

The first computation of UPRSB is to reduce the obligation of the IRR and retired personnel associated with the unit to reflect the time period just served, much as Subroutine UPRS does for IRR and retired personnel in the free pools. Personnel who had one time period of obligation left are now removed from consideration, and personnel who had i time periods of obligation left now have i-1.

The year and term updates for active duty personnel in the unit are as described in UPRS for the free pools, except the personnel entering the IRR and retirement remain associated with the unit.

Subroutine UPRSEF is called to recompute all components of the familiarity training measure vector, taking into account the movement of personnel between active duty, IRR, retired, and no longer obligated groups, and the varying numbers and years of service of such personnel. Subroutine SMPRSU and Function COVFTM then recompute the total numbers of personnel associated with the unit and the unit's overall FI.

SUBROUTINE UPUNIT ("UPDATE UNITS")

Subroutine UPUNIT updates the "ages" (number of time periods of existence) and statuses of all units, reports the results, and takes certain actions if units enter a new status. In simulating the Current System, Subroutine UPUNIT merely updates the age of each unit (variable NAGEUN) by unity; all units are fully manned so Subroutine UPUNIT performs no further computations.

Subroutine UPUNIT becomes more complicated when simulating the UCM. Recall that a unit spends an input number of time periods in Ready status, then an input number of time periods in Standby 1 status, and then an input number of time periods in Standby 2 status. Thus, the status of a unit can be obtained from its age. Subroutine UPUNIT first updates the age of each unit by unity. Then, the subroutine UPUNIT identifies those units that have reached the end of their Standby 1 period. In each such unit, a subset ("reassignable fragment") of the active duty personnel is broken off from the unit and becomes available to lead newly forming Ready units (see Subroutine FMUNIT). The subset is determined by multiplying the number of personnel just entering year I of term J by the input FS1RSG(I,J), for each (I,J) pair (and summing over I and J). The remainder of the active duty personnel in the unit, and all the IRR and retired personnel associated with the unit, stay with the unit as it moves into Standby 2 status. Subroutine UPUNIT calls Subroutine RMSS1 to calculate the Familiarity Index for the subset and to recalculate the familiarity vector of the remainder for the unit. Subroutine RMSS1 takes into account the possibly differing years of service in the subset and the remainder.

The information associated with these subsets is stored in several working variables and can be considered as a "list of reassignable fragments."

The subroutine then proceeds to the treatment of other units. For Ready units, no further computations are performed. The relevant computations for units just entering Standby 1 status were performed in Subroutine UPRDSB. Units that have reached the end of their Standby 2 status are "dismantled." All IRR and retired personnel that were associated with the unit enter the IRR and retired free pools, respectively. All of the active duty personnel associated with the unit become a reassignable fragment, which is added to the list of reassignable fragments. The active duty component of the familiarity vector of the dismantled unit becomes the Familiarity Index for the reassignable fragment. All working variables pertaining to the unit are reinitialized. Many of the associated computations are performed by Subroutine DSMUNT, which Subroutine UPUNIT calls.

The identification numbers of units that remain in Standby 2 status are put on a list. After all units have been processed, this list is sorted in order of reverse unit age (oldest to youngest). The sort is performed by Subroutine SORSB2. The sorted list can be accessed by Subroutine FMUNIT, as described below.

SUBROUTINE FMUNIT ("form [new] units")

Subroutine FMUNIT models the formation of new units in simulating the UCM. The models tries to maintain an input number, NRUD, of Ready units. After some initializations, Subroutine FMUNIT starts by counting up the current number of Ready units. If this number is greater than or equal to NRUD, then no new units are formed, all personnel in the reassignable fragments are transferred to the active duty free pool, and the subroutine ends. (Subroutine NONWUN is called to perform some of the relevant computations.)

If the current number of units is less than NRUD, then the difference, denoted by the working variable NARU, is the number of units that should be formed. Each new unit is required to have the input number SPPUN(2) Senior personnel. All the Senior active duty personnel from the reassignable fragments and the free pools are added together. If there are insufficient Seniors to form NARU units (i.e., if the total is less than NARU*SPPUN(2)) then existing Standby 2 units are dismantled to free up additional active duty Senior personnel. (Subroutine DSMUNT performs most of the relevant calculations.) These units are dismantled one by one, and are chosen in order from the sorted list of Standby 2 units prepared in Subroutine UPUNIT. The group of active duty personnel in each dismantled unit is put on the list of reassignable fragments, and its Senior personnel are added to the total. When the total exceeds NARU*SPPUN(2), the dismantling procedure stops. (Note that these Standby 2 units are dismantled in toto. The model could be changed to break off from a Standby 2 unit only the number of Senior personnel needed.) If there are insufficient Seniors to form NARU new units even after all existing standby 2 units have been dismantled, a warning message is printed and as many new units as possible will be formed.

The number of new units to be formed is denoted by the working variable NNEWUN; it is equal to NARU or to some lesser number if there is a shortage of Senior personnel. Each unit is to have SPPUN(1) total personnel, thus SPPUN(1)-SPPUN(2) junior personnel, and the total requirement for Junior personnel is thus NNEWUN*(SPPUN(1)-SPPUN(2)). The Junior personnel in the free pools and

reassignable fragments, if any, fill part of this requirement. The remainder is filled by newly trained personnel; as in Subroutine DPGONE, the number of newly trained personnel required is added to the model and reported on the summary output. (The input FPG(1) operates here the same way as it does in Subroutine DPGONE.) All newly trained personnel are assumed to be entering the second year of their first term.

The amalgamation of the Junior and Senior personnel into units is then modeled. Groups of (Senior) personnel from the list of reassignable fragments are kept together as much as possible. Some reassignable fragments might be unused, or only partially used, if there are more than enough Senior personnel on hand. The fragments first on the list are used first. The newly trained personnel are brought in to fill Junior slots as necessary. Any remaining slots, Junior or Senior, are filled from the free pools. Subroutines ASGON and ASGFP are used for part of the relevant computations.

For each newly formed unit, Subroutine FMUFTM is called to compute the Familiarity Index for the unit. For its computations, Subroutine FMUFTM makes use of the following quantities:

- the number of personnel coming from each reassignable fragment to the newly formed unit, and the Familiarity Indices of these fragments; different fragments are assumed to have no familiarity with one another;
- the number of newly trained personnel entering the unit; groups of such personnel that trained together are assumed to be assigned to units together, so that the newly trained personnel entering the unit emobdy one year of training together;
- the number of personnel from the free pools entering the unit; such personnel are assumed to have an input baseline average familiarity BFFPFP with one another and BFFPRA with the reassignable fragments (these inputs could well be zero).

Subroutine FMUFTM determines the relevant numbers of pairs of people and averages the various familiarities accordingly. Subroutine FMUNIT then initializes certain working variables associated with the newly formed unit.

All personnel from the reassignable fragments who were not assigned to units are added to the active duty free pool.

SUBROUTINE DELSEN ("delete seniors")

Subroutine DELSEN is used in simulating Current System, to remove excess Seniors from the units. Recall that the model considers all first term personnel to be Junior and all other personnel to be Senior. When personnel reenlist for a second term, a number of Junior personnel will become Senior, and the number of Senior personnel in a unit might grow beyond the desired (input) number SPPUN(2). In this case, Subroutine DELSEN transfers the excess Seniors to the free pools. (Later on, Subroutine REFLUN will add Junior personnel to the unit to bring the unit to full strength.) Within the Senior rank class, the number of personnel in a given year and term leaving the unit is proportional to the number of personnel in that year and term present in the unit (at the start of DELSEN).

Since Seniors, but not Juniors, are transferred out of the unit, and since Seniors, on balance, have more familiarity among the unit personnel, the overall Familiarity Index will in general change. Subroutine DELSEN calls Subroutine UPREFC to recompute the measure, based on the relative years of service of the departers and remainers.

Subroutine DELSEN is optional; if the input variable IBFEX has a nonzero value, the routine will not be executed.

If the input variable IWRTRF equals 1, Subroutine DELSEN will print some results on the detailed printout; a value of 2 for IWRTRF will yield additional printout.

SUBROUTINE REFLUN ("re-fill units")

Subroutine REFLUN is used in simulating the Current System. In some sense, it is the opposite of DELSEN; it adds personnel to the units to bring the numbers of personnel in each unit up to the required numbers. Each unit should have (the input) SPPUN(2) Seniors and SPPUN(1)-SPPUN(2) Juniors. (Personnel deficiencies might occur because people transferred to the IRR or retired. A deficiency in Junior personnel might occur if many Junior personnel were promoted to Senior.) The total numbers of Junior and Senior personnel in each unit are determined and the deficiencies,if any, are noted. Senior personnel are transferred in from the free pools to fill deficiencies of Seniors. If there are not enough Seniors in the free pool, a warning message is printed (and shortfalls are filled to the extent possible). If there are any Junior personnel in the free pools, they are used to fill shortfalls of Junior personnel to the extent possible. Remaining shortfalls of Juniors are filled with newly trained personnel. The number of newly trained

personnel needed is added to the cumulative total of newly trained personnel needed. (The input variable FPG(1) is used here in the same way as in DPGONE and FMUNIT.)

To each unit, people might have been added from as many as three distinct groups: senior personnel from the free pools, junior personnel from the free pools, and newly trained personnel. The inputs BFRPRP, BFRPU, and BTNRL specify certain baseline familiarities between the groups of added people and the personnel originally in the unit. Subroutine CMPFTM is called to recompute the Familiarity Index, based on the additional personnel and their intergroup familiarities. Subroutine SMPRSU and Function COVFTM are called to recompute the personnel totals and overall familiarity training measure. The treatment is similar to that of Subroutine CMPEFF, and many of the same input variables are used, but CMPEFF also considered additional training time.

Indeed, the Familiarity Index of a unit at the end of Subroutine CMPEFF is about as high as possible; the unit personnel (except for replacements) are assumed to have just completed a time period of training together. After REFLUN, the FI is at a low point for the time period: turnover has been represented, people have gone to the IRR and retirement and have been replaced with unfamiliar personnel, and newly trained people might have just entered the unit. A running average of unit FI's at the end of Subroutine REFLUN is computed and stored throughout the model. The final value of this average is reported on the one page summary output, along with value of a similar running average taken at the end of Subroutine CMPEFF.

C. LIST OF INPUT VARIABLES, DEFINITIONS, AND SAMPLE DATA VALUES

This section lists input variables and provides dimension limits, mnemories, and definitions for them. Next (after the words "Sample Value") each entry provides the data values used to produce the simulation results reported in Chapter 1 and detailed in Appendix A.

ANPAT

Temporarily used as multiplier in Subroutine DPGONE to determine replacements as the multiple ANPAT times losses to date. A value of zero is treated as though it were 1. The value should be zero when simulating the Current System.

Sample value: 2.00000.

BFCNU

Currently used as an upper limit on the total number of active duty personnel that can be removed (reassigned) from a unit that is ending its Standby 1 status. Applies to Unit Cohension Model only.

Sample value: 150.

BFFPFP(I)

Dimension limit: (2)

Mnemonic: "baseline familiarity free pools & free pools" Baseline familiarity between active duty personnel in the free pool. That is, on average, two people in the active duty free pool have trained together for BFFPFP time periods (at some previous time when they were in some unit together). This input could easily be set to zero. Applied in Subroutine FMUFTM, which is called by Subroutine FMUNIT. NOTE: only component 1 is currently used.

Sample values: 0.00000 0.00000

BFFPRA(I)

Dimension limit: (2)

Mnemonic: "baseline familiarity free pools & reassignable fragments" Baseline familiarity between a person in the active duty free pool and a person in an active duty reassignable fragment of some unit. That is, on average, a person in the active duty free pool and a person in the reassignable fragment have trained together for BFFPRA time periods (at some previous time when they were in some unit together). This input could easily be set to zero. Applied in Subroutine FMUFTM, which is called by Subroutine FMUNIT. (In this context, a "reassignable fragment" consists of either the active duty personnel in a unit that has reached the end of its standby 2 status or a fraction of the active duty personnel in a unit that has reached the end of its standby 1 status. Such a fragment can form part of a new unit.) NOTE: only component 1 is currently used.

Sample values: 0.00000 0.00000

BFRPRP(IRNK)

Dimension limit: (2)

Mnemonic: "baseline familiarity replacements & replacements" Baseline familiarity between the people of rank IRNK that are replacing personnel losses (of rank IRNK). That is, on average, one replacement and another have trained together for BFRPRP(IRNK) time periods (at some previous time when they were in some unit together). This input could easily be set to zero. IRNK=1--junior personnel; IRNK=2--senior. BFRPRP(1) is also used as the baseline familiarity between junior replacements and senior replacements. Applied in Subroutines CMPEFF and CMPFTM, and in Subroutine REFLUN in simulating the Current System.

Sample values: 0.00000 0.00000

BFRPU(IRNK)

Dimension limit: (2)

Mnemonic: "baseline familiarity replacements & units" Baseline familiarity between a replacement of rank IRNK for lost personnel (of rank IRNK) and the personnel in the unit that the replacement is entering. That is, on average, the replacement and a person in the unit have trained together for BFRPU time periods (at some previous time when they were in some unit together). This input could easily be set to zero. IRNK=1--junior personnel; IRNK=2--senior. Applied in Subroutines CMPEFF and CMPFTM, and in Subroutine REFLUN in simulating the Current System.

Sample values: 0.00000 0.00000

BTNRA

Not currently used.

BTNRL

Mnemonic: "basic training for new recruits replacing losses" Amount of training familiarity that newly trained personnel already have when they replace losses. Applied in Subroutine CMPFTM.

Sample value: 1.00000

FACIR(ITPTM,ITERM)

Dimension limits: (4, 5)

Mnemonic: "fraction of active duty to IRR" Fraction of active duty personnel at the end of time period (year) ITPTM of term ITERM who go to the IRR (instead of remaining

on active duty). For ITPTM = NTPTM, this is the fraction of people who do not renew for another term; i.e., the reenlistment rate is 1-FACIR. FACIR(NTPTM,NTERM) is ignored--such people retire. NOTE: The fractions FACIR are applied to the numbers of personnel that remain after the fractions FPG have been applied.

Sample values:

ITPTM = 1 0.000000.00000 0.00000 0.00000 0.00000

ITPTM = 2 0.00000 0.00000 0.00000 0.00000 0.00000

ITPTM = 3 0.00000 0.00000 0.00000 0.00000 0.00000

ITPTM = 4 0.50000 0.50000 0.20000 0.15000 0.10000

FACTO(ITPTM,ITERM)

Dimension limits: (4, 5)

Mnemonic: "fraction of active duty turning over" Fraction of active duty personnel at the end of time period (year) ITPTM of term ITERM who turn over (instead of remaining with their current unit). This is used if IMCA=1, i.e., if the "current army" model is simulated, to model turnover in the units. NOTE: The fractions FACTO are applied to the numbers of personnel that remain after the fractions FPG and FACIR have been applied.

Sample values:

ITPTM = 1 0.00000 0.00000 0.00000 0.00000 0.00000

ITPTM = 2 0.00000 0.00000 0.00000 0.00000 0.00000

ITPTM = 3 0.00000 0.00000 0.00000 0.00000 0.00000

ITPTM = 4 0.00000 0.00000 0.00000 0.00000 0.00000

FPG(IGC)

Dimension limit: (6)

Mnemonic: "fraction of personnel gone" Fraction of personnel in category IGC that are losses this year. (Does not include people who go from active duty to IRR or retirement). Categories are as follows:

IGC = 1--first (training) year

IGC = 2--junior active duty personnel in units or in free pools

IGC = 3--senior active duty personnel in units or in free pools

IGC = 4--IRR

IGC = 5--Retired

IGC = 6--(not currently used)

Sample values:

0.20000 0.05000 0.02000 0.02000 0.02000 0.00000

FS1RSG(ITPTM,ITERM)

Dimension limits: (4, 5)

Mnemonic: "fraction of standby 1 personnel reassignable" Fraction of active duty personnel in time period ITPTM of term ITERM in units at the end of their standby 1 status who will be reassigned to new units (or free pool).

Sample values:

ITPTM = 1	1.00000	0.50000	0.30000	0.00000	0.00000
ITPTM = 2	1.00000	0.50000	0.30000	0.00000	0.00000
ITPTM = 3	1.00000	0.50000	0.30000	0.00000	0.00000
ITPTM = 4	1.00000	0.50000	0.30000	0.00000	0.00000

FTMVC(I,IBFE)

Dimension limits: (6, 30)

Mnemonic: "familiarity training measure vector" Familiarity Index vector for the unit in the IBFE-th BFE set. This is a vector by the categories of personnel that make up the unit. Component 1--familiarity/training among active duty personnel in the unit, component 2--IRR, component 3--retirees, component 4--inter-familiarity between active duty and IRR personnel, component 5--active duty and retirees, component 6--IRR and retirees. Note that, in simulating the Current System, only component 1 is used.

Sample Values:

I = 1	0.70000	0.70000	1.70000	1.70000	2.70000
	2.70000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
I = 2	0.00000	0.00000	0.00000	0.00000	0.00000

	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
I = 3	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
I = 4	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
I = 5	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
I = 6	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000
	0.00000	0.00000	0.00000	0.00000	0.00000

IBFEOC(IBFE)

Dimension limit: (30)

Mnemonic: "is barracks, flags, and equipment set occupied?" 0 if unit ID number IBFE is not currently in use; 1 if it is. (Note: unit ID's do not necessarily refer to actual BFE sets.)

Sample values:

1	1	1	1	1
1	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

IBFEX

Currently used as indicator for performance of Subroutine DELSEN, in simulating the Current System. 0--call DELSEN; nonzero--do not.

Sample Value: 0

IMCA

Mnemonic: "indicator to model current army" 0 if "Unit Cohesion" scenario is simulated in this run; 1 if "Current Army" scenario is simulated in this run. "Current Army" scenario has no standby units and models turnover in ready units.

Sample Value: 0

INPAT

Temporarily used in Program UPTM if Current System is exercised. A zero value means that Program UPTM calls Subroutine DELSEN; a nonzero value means that DELSEN is not called. (Input value will normally be zero.)

Sample Value: 0

IWRTCM

Mnemonic: "indicator for writeout, Subroutine CMPEFF" Indicator for detailed printout in Subroutine CMPEFF.

0--no printout

1--basic printout

2--more extensive printout

Sample Value: 0

IWRTCN

Mnemonic: "indicator for writeout, Subroutine CNSUNT" Not currently used.

Sample Value: 0

IWRTFM

Mnemonic: "indicator for writeout, Subroutine FMUNIT" Indicator for detailed printout in Subroutine FMUNIT.

0--no printout

1--basic printout

2--more extensive printout

Sample Value: 1

IWRTG

Mnemonic: "indicator for writeout, global" Currently used only as indicator for certain printout in the main program. 1--print certain printout; 0--do not.

Sample Value: 0

IWRTPG

Mnemonic: "indicator for writeout, Subroutine DPGONE" Indicator for detailed printout in Subroutine DPGONE.

0--no printout

1--basic printout

2--more extensive printout

Sample Value: 0

IWRTRF

Mnemonic: "indicator for writeout, Subroutine REFLUN" Indicator for detailed printout in Subroutines REFLUN and DELSEN.

0--no printout

1--basic printout

2--more extensive printout

Sample Value: 0

IWRTUP

Mnemonic: "indicator for writeout, Subroutine UPRS" Indicator for detailed printout in Subroutine UPRS and the subroutines it calls (UPRDY, UPRDSB, UPRSB, and UPRCA); also temporarily used in Subroutine TRNOVR.

0--no printout

1--basic printout

2--more extensive printout

Sample Value: 0

IWRTUU

Mnemonic: "indicator for writeout, Subroutine UPUNIT" Indicator for detailed printout in Subroutine UPUNIT.

0--no printout

1--basic printout

2--more extensive printout

Sample Value: 0

NAGEUN(IBFE)

Dimension limit: (30)

Mnemonic: "(integer) age of unit" Current "age" of the unit assigned to BFE set IBFE; that is, (strictly speaking, one more than) the number of (full) time periods this unit has been in existence. (E.g., if the unit in BFE set 2 is in its fourth year, then NAGEUN(2) = 4.)

Sample values:

1	1	2	2	3
3	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

NBFE

Mnemonic: "number of sets of barracks, flags, and equipment" Maximum number of units (ready plus standby) that one wants to consider. In previous version of model, NBFE stood for actual number of BFE sets, but now merely is a limit on the number of units to process. If IMCA=0. NBFE should be set high, to encompass all ready and standby units that might form. If IMCA=1, NBFE should be set to the precise number of ready units desired.

Sample Value: 30

NOBIRF

Mnemonic: "number of years of obligation--IRR fill-up" Not currently used.

Sample Value: 0

NOBLIR

Mnemonic: "number of years of obligation--IRR" Number of years of obligation in the IRR that a person has upon entering the IRR.

Sample Value: 4

NOBLRT

Mnemonic: "number of years of obligation--retirees" Number of years that a newly retired person will be considered for return to a standby unit.

Sample Value: 4

NRPLT

Mnemonic: "number of replacement times" Number of times in the ready period of a unit that replacements for losses will enter the unit. See also VRPLT. Applied in Subroutine DPGONE. (Irrelevant if IMCA=1.)

Sample Value: 1

NRUD

Mnemonic: "number of ready units desired" Number of ready units that the user desires to maintain. Subroutine FMUNIT will try to ensure that there are sufficient senior personnel and will bring in new recruits as necessary to form enough new units to bring the total number of ready units up to NRUD. (Irrelevant if IMCA=1.)

Sample Value: 6

NTERM

Mnemonic: "number of terms" Maximum number of terms that a person serves. A person retires upon completing year (time period) NTPTM of term NTERM. Suggested value = 5.

Sample Value: 5

NTP

Mnemonic: "number of time periods" Number of time periods to run the model.

Sample Value: 25

NTPTM

Mnemonic: "number of time periods per term" The number of time periods (years) in a term of enlistment in the active component. Suggested value = 4.

Sample Value: 4

NYURDY

Mnemonic: "number of years unit ready status" The number of time periods (years) a unit spends in ready status. Suggested value = 3 if IMCA=0. Should be very high (at least NTP) if IMCA=1 ("current army" scenario).

Sample Value: 3

NYUSB1

Mnemonic: "number of years unit standby 1 status" The number of time periods (years) a unit spends in standby 1 status. Suggested value = 1. (Irrelevant if IMCA=1.)

Sample Value: 1

NYUSB2

Mnemonic: "number of years unit standby 2 status" The number of time periods (years) a unit spends in standby 2 status. (Irrelevant if IMCA=1.)

Sample Value: 3

PACDF(ITPTM,ITERM)

Dimension limits: (4, 5)

Mnemonic: "personnel active duty free pools" Number of active duty personnel in time period (year) ITPTM of term ITERM in the free pool (i.e., not associated with any unit).

Sample values:

ITPTM = 1	0.00000	225.00000	135.00000	45.00000	45.00000
ITPTM = 2	0.00000	225.00000	135.00000	45.00000	45.00000
ITPTM = 3	0.00000	225.00000	135.00000	45.00000	45.00000
ITPTM = 4	0.00000	225.00000	135.00000	45.00000	45.00000

PACDU(ITPTM,ITERM,IBFE)

Dimension limits: (4, 5, 30)

Mnemonic: "personnel active duty units" Number of active duty personnel in time period (year) ITPTM of term ITERM associated with the unit using BFE set IBFE.

Sample values:

IBFE = 1

ITPTM = 1	0.00000	50.00000	30.00000	10.00000	10.00000
ITPTM = 2	700.00000	50.00000	30.00000	10.00000	10.00000
ITPTM = 3	0.00000	50.00000	30.00000	10.00000	10.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 2

ITPTM = 1	0.00000	50.00000	30.00000	10.00000	10.00000
ITPTM = 2	700.00000	50.00000	30.00000	10.00000	10.00000
ITPTM = 3	0.00000	50.00000	30.00000	10.00000	10.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 3

ITPTM = 1	0.00000	0.00000	30.00000	0.00000	0.00000
ITPTM = 2	0.00000	50.00000	30.00000	10.00000	10.00000
ITPTM = 3	700.00000	50.00000	30.00000	10.00000	10.00000
ITPTM = 4	0.00000	50.00000	0.00000	10.00000	10.00000

IBFE = 4

ITPTM = 1	0.00000	0.00000	30.00000	0.00000	0.00000
ITPTM = 2	0.00000	50.00000	30.00000	10.00000	10.00000
ITPTM = 3	700.00000	50.00000	30.00000	10.00000	10.00000
ITPTM = 4	0.00000	50.00000	0.00000	10.00000	10.00000

IBFE = 5

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	50.00000	30.00000	10.00000	10.00000
ITPTM = 4	700.00000	100.00000	60.00000	20.00000	20.00000

IBFE = 6

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	50.00000	30.00000	10.00000	10.00000
ITPTM = 4	700.00000	100.00000	60.00000	20.00000	20.00000

IBFE = 7

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 8

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 9

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 10

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 11

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 12

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 13

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 14

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 15

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 16

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 17

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 18

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 19

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 20

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 21

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 22

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 23

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 24

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 25

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 26

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 27

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 28

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 29

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

IBFE = 30

ITPTM = 1	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 2	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 3	0.00000	0.00000	0.00000	0.00000	0.00000
ITPTM = 4	0.00000	0.00000	0.00000	0.00000	0.00000

PIRRF(IRANK,ITPOL)

Dimension limits: (2, 10)

Mnemonic: "personnel IRR free pools" Number of IRR personnel in rank class IRANK with ITPOL time periods of obligation left that are not associated with any unit. (These people might be available to form call-up units in a future version of the model, so we can track the number now.) (IRANK=1--junior; IRANK=2--senior) Rank is for reporting purposes only; does not currently affect any algorithms.

Sample values:

IRANK = 1 0.00000 0.00000 0.00000 0.00000 0.00000
0.00000 0.00000 0.00000 0.00000 0.00000

IRANK = 2 0.00000 0.00000 0.00000 0.00000 0.00000
0.00000 0.00000 0.00000 0.00000 0.00000

POVFS2

Not currently used.

Sample Value: 0.00000

PRETF(ITPOL)

Dimension limit: (10)

Mnemonic: "personnel retired free pools" Number of retired personnel with ITPOL time periods of obligation left that are not associated with any unit. (These people might be available to form call-up units in a future version of the model, so we can track the number now.)

Sample Values:

0.00000 0.00000 0.00000 0.00000 0.00000
0.00000 0.00000 0.00000 0.00000 0.00000

RTIRR

Mnemonic: "refresher training for IRR Fraction of a time period that the IRR personnel associated with a unit go back for active training with that unit. For example, 2 weeks = .038 year, so if the time period is a year and the IRR personnel go back for 2 weeks of training with the unit they are associated with, then RTIRR should equal .038.

Sample Value: 0.03800

RTRET

Mnemonic: "refresher training for retirees" Fraction of a time period that the retired personnel associated with a unit go back for active training with that unit (see RTIRR). This input can easily be set to zero.

Sample Value: 0.03800

RTSBU

Mnemonic: "refresher training for standby unit" Fraction of a time period that the personnel associated with a unit in standby 2 status come back to train actively together. Active duty personnel get RTSBU of a time period of training, IRR personnel,

min{RTIRR,RTSBU}, and retirees, min{RTRET;RTSBU}, which could easily be zero. (Irrelevant if IMCA=1.) Note: standby 1 units are assumed to get no refresher training.

Sample Value: 0.05700

SPPUN(IRANK)

Dimension limit: (2)

Mnemonic: "suggested personnel per unit" Standard or suggested number of people per unit who are of rank class IRANK OR HIGHER. Thus SPPUN(1) is the suggested total number of people per unit. (For now, just two ranks, junior and senior. First-termers are junior, people in second term and above are senior.)

Sample Values: 1000.00000 300.00000

TPNPAT

Mnemonic: "time phased new personnel attempting training" Not currently used.

Sample Value: 0.00000

VRPLT(IRPLT)

Dimension limit: (50)

Mnemonic: "vector of replacement times" List of times in the ready period of a unit that replacements for losses will enter the unit. Elements 1 through NRPLT of this vector are used. Applied in Subroutine DPGONE. See also NRPLT. (Irrelevant if IMCA=1.)

Sample values:

1.50000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000

WFSFNU

Mnemonic: "weight for senior fraction in new units" Not currently used.

Sample Value: 0.00000

D. BRIEF DESCRIPTIONS OF ROUTINES

1. PROGRAM UPTM ("unit personnel tracking model")

Main program--unit personnel tracking model. Simulates units and personnel, under either the "Current System" or "Unit Cohesion" Model.

2. SUBROUTINE ASGFP ("assign from free pools")

Used in simulating the Unit Cohesion Model. Fills a newly forming unit with personnel from the free pools, and updates the totals appropriately. Called by Subroutine FMUNIT.

3. SUBROUTINE ASGON ("assign from old unit")

Used in simulating the Unit Cohesion Model. Adds a fraction of the reassignable personnel from a certain given unit on the reassignable list into a certain given newly forming unit, and updates the reassignable totals appropriately. Called by Subroutine FMUNIT.

4. BLOCK DATA BLKINP ("block data for Subroutine INP")

Initializes certain information on the names, dimension sizes, and storage locations of input variables. This information is used by Subroutine INP.

5. SUBROUTINE CMPEFF ("compute effectiveness")

Determines and outputs the overall familiarity training measure of each unit. "Major" subroutine, called by Program UPTM.

6. SUBROUTINE CMPFTM ("compute familiarity training measure")

Performs some computations necessary to determine the familiarity training measure. Called by Subroutines CMPEFF, REFLUN, and TRNOVR.

7. FUNCTION COVFTM ("compute overall familiarity training measure")

Computes the overall familiarity training measure of a unit from the familiarity training measures of the active duty, IRR and retired components. (In the Current Army model, the overall measure is equal to the active duty component measure and the IRR and retired measures are not used.) Called by many of the routines.

8. SUBROUTINE DELSEN ("delete seniors")

Used in simulating the Current System. If the number of senior personnel in a unit exceeds the standard number, Subroutine DELSEN transfers the excess to the free pools, and updates the familiarity training measure of the unit accordingly. "Major" subroutine, called by Program UPTM.

9. SUBROUTINE DPGONE ("determine personnel gone")

Determines numbers of personnel who leave permanently and computes number of replacements for these personnel. Used in simulating both Unit Cohesion Model and Current Systems, but details of DPGONE differ between the two scenarios. "Major" subroutine, called by Program UPTM.

10. SUBROUTINE DSMUNT ("dismantle unit")

Used in simulating the Unit Cohesion Model. Dismantles a standby 2 unit; i.e., puts the unit's active duty personnel on the list of reassignable unit fragments and adds its IRR and retired personnel to the IRR and retired free pools, respectively. Called by UPUNIT (for those units reaching the end of standby 2 status) and by FMUNIT (for those units that are prematurely dismantled to free up senior personnel).

11. SUBROUTINE FMUFTM ("formed unit familiarity training measure")

Used in simulating the Unit Cohesion Model. Computes the familiarity training measure vector of a newly formed unit, using the working arrays of personnel from the reassignable fragments that go to this unit, the number of newly trained personnel entering this unit, the number of personnel from the free pools entering this unit, and the vector of active duty familiarity training measures of the reassignable fragments. Called by Subroutine FMUNIT.

12. SUBROUTINE FMUNIT ("form [new] units")

Used in The Unit Cohesion Model. Models the formation of new units from new trainees, people from the free pools, and possibly some active duty personnel taken from units at the end of a standby 1 year or from dismantled standby 2 units. Subroutine FMUNIT should be thought of as occurring at the end of a time period and the beginning of the next time period. "Major" subroutine, called by Program UPTM.

13. FUNCTION IAGEPF ("integer age of personnel function")

Determines the "age" (number of years of service of a person) from the person's year and term. Called by several subroutines.

14. SUBROUTINE INITLZ ("initialize")

Initializes certain working variables. Called by Program UPTM.

15. SUBROUTINE INP ("input")

Reads the data files containing values of the input variables and (optionally) definitions of the input variables, and prints these data values and definitions. Called by Program UPTM.

16. SUBROUTINE NONWUN ("no new units")

Used in The Unit Cohesion Model. Puts all available personnel into free pools. Called by Subroutine FMUNIT if (for some reason) no new units are to be formed.

17. SUBROUTINE READIN ("read integer")

Reads a set of integer input data values into a temporary storage array. Called by Subroutine INP.

18. SUBROUTINE READRL ("read real number")

Reads a set of real input data values into a temporary storage array. Called by Subroutine INP.

19. SUBROUTINE REFLUN ("re-fill units")

Used in The Current System. Replaces personnel who have left active duty with new personnel, and recomputes the familiarity training measure accordingly. Subroutine REFLUN should be thought of as occurring at the end of a time period and the beginning of the next time period. "Major" subroutine, called by Program UPTM.

20. SUBROUTINE RITEIO ("write input/output")

Reads a set of input data values into a temporary storage array, which will later be written out. Called by Subroutine INP.

21. SUBROUTINE RMSS1 ("recompute measures for split standby 1 unit")

Used in The Unit Cohesion Model. For a unit that has reached the end of its standby 1 year, the routine computes the familiarity training measure for the fragment of active duty personnel in the unit that will be reassigned to form new units, and recomputes the measures for the unit, based on the remaining numbers of personnel. Called by Subroutine UPUNIT.

22. SUBROUTINE SMBTRM ("sum by term")

For each unit, for the free pools, and for a total over units and free pools, this routine sums the active duty personnel by rank and computes the percentages of senior personnel that are in term i. These values are output on a special output file. Called by Subroutines INITLZ and CMPEFF.

23. SUBROUTINE SMPRSU ("sum personnel in unit")

Sums the numbers of personnel associated with a given unit, and stores the sums for future use. Called by many of the routines.

24. SUBROUTINE SORSB2 ("sort standby 2 units")

Used in the Unit Cohesion Model. Prepares a list of identification numbers of standby 2 units, ordered by age (oldest units first). This list will be accessed by Subroutine FMUNIT if it is necessary to dismantle some standby 2 units prematurely. Called by Subroutine UPUNIT.

25. SUBROUTINE SUMTAB ("summary table")

Prints an "executive summary" file, showing overall average values of number of units, strength of units, and familiarity training measures. Called by Program UPTM at the very end of the simulation.

26. SUBROUTINE TIMET ("time t [non-initial input value]")

Can update the value of an input variable, if such a change is specified by the user. Called by Program UPTM.

27. SUBROUTINE TRNOVR ("turnover")

Used in the Current System. Models turnover in the units if the the Current System is being simulated. The number of personnel in each unit remains unchanged, but the familiarity training measure of the unit is recomputed to reflect the replacement of an input fraction of the existing personnel by unfamiliar personnel. Subroutine TRNOVR should be thought of as occurring between the end of a time period and the beginning of next time period. "Major" subroutine, called by Program UPTM.

28. SUBROUTINE UPRCA ("update personnel--current army")

Used in the Current System. For each unit, updates the term numbers and year numbers of personnel, determines numbers of personnel who go to the IRR or retire, and updates the familiarity training measure appropriately (via a call to Subroutine UPREFC). Called by Subroutine UPRS.

29. SUBROUTINE UPRDSB ("update personnel--ready to standby")

Used in the Unit Cohesion Model. For each unit that is about to transition from ready to standby status, this routine updates the term numbers and year numbers of personnel, determines numbers of personnel who go to the IRR or retire, transfers such personnel, and updates all components of the familiarity training measure (via a call to UPRSEF). Called by Subroutine UPRS.

30. SUBROUTINE UPRDY ("update personnel--ready unit")

Used in the Unit Cohesion Model. For each ready unit, this routine updates the term numbers and year numbers of personnel, and determines numbers of personnel who

will go to the IRR or retirement when the unit enters standby status (these numbers are stored in a working array). (There is no need to update the familiarity training measure at this point.). Called by Subroutine UPRS.

31. SUBROUTINE UPREFC ("update personnel effectiveness--current Army")

Used in the Current System. Updates the familiarity training measure of a unit when an subgroup of people is removed from that unit. Called by Subroutines UPRCA, TRNOVR, and DELSEN.

32. SUBROUTINE UPRS ("update personnel")

Updates the term numbers and year numbers of personnel, determines numbers of personnel who go to the IRR or retire, reduces remaining obligation for personnel currently in IRR or retirement, and updates all status variables appropriately. For personnel in the free pools, these computations are performed by Subroutine UPRS itself; for personnel in units, the computations are performed by Subroutines UPRCA, UPRDY, UPRDSB, and/or UPRSB, which UPRS calls. Subroutine UPRS should be thought of as occurring between the end of a time period and the beginning of the next time period. Statuses of units are updated in Subroutine UPUNIT. "Major" subroutine, called by Program UPTM.

33. SUBROUTINE UPRSB ("update personnel--standby unit")

Used in the Unit Cohesion Model. For each unit in a standby status, this routine updates the term numbers and year numbers of personnel, determines additional numbers of personnel who go to the IRR or retire, reduces remaining obligation for personnel associated with the unit who are currently in IRR or retirement, and updates all components of the familiarity training measure appropriately (via a call to UPRSEF). Called by Subroutine UPRS.

34. SUBROUTINE UPRSEF ("update personnel and [associated] effectiveness measures")

Used in the Unit Cohesion Model. Updates the familiarity training measure vector for a given unit based on the movement of that unit's personnel from active duty to IRR and retired status and the finishing of obligation of IRR and retired personnel. Relative

length of service of personnel is taken into account. Called by Subroutines UPRSB and UPRDSB.

35. SUBROUTINE UPUNIT ("update units")

Updates the statuses of units and updates all status variables appropriately. Dismantles units past their NYUSB2-th year in standby 2 status. For units reaching the end of their standby 1 year, and for active duty personnel in units reaching the end of standby 2 status, it determines a provisional number of people available to help lead new units. (In the the Current System, Subroutine UPUNIT merely updates the age of each unit, which remains in ready status.) "Major" subroutine, called by Program UPTM.

APPENDIX C

USING READY-STANDBY ORGANIZATION TO ADJUST TO BUDGET CUTS

USING READY-STANDBY ORGANIZATION TO RESPOND TO BUDGET CUTS

This appendix provides additional detail on each Service's potential to respond to budget reductions by incorporating Standby forces in the active component. The Standby concept provides an unusual challenge to cost analysts. No Standby units exist today and none has existed in the past. Therefore estimates have to be made about the likely cost of maintaining a Standby unit without any historical data to go by. In addition, major uncertainties remain about (a) which units would be placed in Standby and how they would be organized, (b) the cost of maintaining Standby equipment, and (c) the cost of managing Standby personnel.

For these reasons, we have not been able to make precise estimates of the cost of Standby forces. We are able, however, to reach general conclusions about the portion of the active component mission force (e.g., the TO&E Army) that would have to be placed in Standby status to adjust to particular budget reductions. These estimates are based on the Operations and Support (O&S) cost of the mission forces and the variable costs of the associated support infrastructure. Table C-1 below shows the average O&S and the average infrastructure spending for the active components of each of the Military Departments during the decade of the 1980's. The O&S costs include the operations and maintenance and military pay costs of mission forces. The infrastructure costs include centralized logistics, training, medical, communications, and personnel as well as installation support and force management & administration.

The cost reductions associated with converting combat units to Standby status will vary by the type of unit involved. Regular ground combat units that place their equipment in storage or that are assigned other equipment (e.g., prepositioned equipment or equipment left behind by Ready units deploying to prepositioned equipment) will have very small O&S costs. (We assume that Army and Marine Standby units will have O&S costs that are only 5 percent of the costs of comparable full-time, full-strength units.)

Table C-1. Average O&S and Infrastructure Spending in the 1980s
(FY90 $Bs)

	Army	Navy	Air Force	Marine	DoD Total
Average Mission O&S	19.5	22.6	17.1	4.1	63.2
Average Infrastructure Spending	33.1	29.2	31.2	4.7	98.2
Variable Portion of Infrastructure per $1.00 Mission O&S (50% fixed, 50% variable)	0.76	0.61	0.84	0.61	0.71

Aviation combat units that are converted to Standby status will have to pay for some personnel to help maintain their equipment. (Recall that the aircraft assigned to Standby squadrons will be flown and maintained on a regular basis by Ready squadrons in the same wing. Thus, Ready units will bear primary responsibility for maintenance.) We assume that Air Force Standby units will have O&S costs that are 10 percent of those of full-strength full-time units in today's Air Force (or of Ready units in the UCM).

Ships that are placed in Standby status will only steam for 8 hours each quarter, so certain operating costs should be quite low compared to those of ships in today's fleet, or ships in Ready status. On the other hand, a Standby ship's 30 percent-strength cadre crew will be composed of relatively more experienced (and hence more costly) sailors, so its MilPers costs ought to be greater than 30 percent of those of an otherwise comparable ship in today's fleet. In light of these offsetting effects, we assume that Navy units in Standby status will have O&S costs that are 30 percent of those of full-time units in today's Navy.

Of course, reductions in O&S spending should be accompanied by reductions in spending on infrastructure. Table C-1's third row lists a set of factors we used to estimate such infrastructure reductions. For example, we estimate that each $1.00 across-the-board reduction in Army O&S spending will result in a $0.76 reduction in associated infrastructure spending. This figure reflects the assumption that 50 percent of infrastructure spending will vary directly in proportion to changes in O&S spending. (It also reflects an allocation of infrastructure costs incurred in support of Active Duty and Reserve forces. For this reason, figures in the third row cannot be computed from figures in the first two.)

Given the assumptions described above, we used Table C-1's figures to estimate the size of budget reductions to which the Services could respond by converting various fractions of their current forces to Standby status. We used the following formulas to make this estimate for the Army:

Army cost reduction total = Mission Force cost reduction + O&S cost reduction

Army Mission Force cost reduction = $19.5 billion x ([95%] x fraction of Mission Force converted to Standby)

Army O&S cost reduction = 0.76 x Army Mission Force cost reduction

To understand how these formulas work, suppose that the Army chose to place 10 percent of its TO&E units (i.e., its "Mission Force") in Standby status. The associated Mission Force cost reduction would be $19.5 billion x 95 percent x 10 percent, or $1.9 billion. The associated O&S cost reduction would be 0.76 x $1.9 billion, or $1.4 billion. The Army cost reduction total would therefore be $3.3 billion

The analogous formulas for the other Services follow:

Navy cost reduction total = Mission Force cost reduction + O&S cost reduction

Navy Mission Force cost reduction = $22.6 billion x ([70%] x fraction of Mission Force converted to Standby)

Navy O&S cost reduction = 0.61 x Navy Mission Force cost reduction

Air Force cost reduction total = Mission Force cost reduction + O&S cost reduction

Air Force Mission Force cost reduction = $17.1 billion x ([90%] x fraction of Mission Force converted to Standby)

Air Force O&S cost reduction = 0.84 x Air Force Mission Force cost reduction

Marine Corps cost reduction total = Mission Force cost reduction + O&S cost reduction

Marine Corps Mission Force cost reduction = $4.1 billion x ([95%] x fraction of Mission Force converted to Standby)

Marine Corps O&S cost reduction = 0.61 x Marine Corps Mission Force cost reduction

Based on these calculations, Table C-2 shows how DoD could respond to budget reductions by converting increasing portions of active component mission forces to Standby status. For example, suppose that DoD was faced with a $10 billion reduction in its annual procurement budget. Suppose further that it wanted to show Congress that it

could absorb that reduction not by procurement cuts, but by O&S/infrastructure reductions. In that case, Table C-2 indicates that DoD could absorb a $10 billion annual reduction by shifting 10 percent of current active component forces to a Standby status. Similarly, it could respond to a $46 billion reduction by converting almost 50 percent of its active component force to Standby status.

Table C-2. Responses to Hypothetical Budget Cuts

Hypothetical Annual Budget Reductions (FY90 $Bs)					Fraction of Operational Force Converted to Standby in Response
Army	Navy	Air Force	Marines	DoD Total	
3.3	2.6	2.8	.6	9.3	10%
8.1	6.4	7.0	1.6	23.1	25%
16.4	12.7	14.2	3.1	46.4	50%

APPENDIX D

REDUCING TROOP STRENGTH OVERSEAS

REDUCING TROOP STRENGTH OVERSEAS

Chapter III asserted that the Army could cut as many as 80,000 personnel from its current strength in Europe with minimal reductions in the number of fully trained divisions that can be mobilized and ready for action within the longer warning times now expected. This appendix discusses ways the Army might do so and provides detail concerning points summarized in Table III-1.

A. INCREASE LOGISTICAL DEPENDENCE ON HOST NATION OR U.S. RESERVE AND CIVILIAN ASSETS

Several categories of U.S. logistical units can be removed and replaced by reliance on the German Territorial Army (TA) and the U.S. reserve component. Taken together, the changes outlined below could reduce U.S. personnel strength in Europe by more than 36,000.

1. Engineers

The U.S. has oriented its engineering units towards construction and maintenance of lines of communication (LOCs). In the event of mobilization, these tasks can be performed by mobilized civil assets under command of the German Territorial Army. In the coming decade, the German government will have to contract with many civilian construction companies to rebuild the rundown infrastructure of the eastern Lander; this prospect affords the Germans the opportunity to provide peacetime work to organizations that could provide construction/LOC maintenance in a mobilization.

Relying on the German TA should permit the U.S. to eliminate 9,000 overseas billets in engineering battalions and bridging companies above the division level.

2. Transport

U.S. units require large amounts of transport support because the U.S. handles distribution via customer pick-up rather than provider delivery. The Germans use the latter system, which is more efficient, and rely on TA units for that purpose. Relying on

the German TA should permit the U.S. to eliminate 3,500 overseas billets in Corps and Army-level transportation units.

Germany is awash in trucks of all shapes and sizes which can be maintained in local repair shops. The U.S. should plan to use these assets in an emergency. (Indeed, the U.S. could stretch available resources further by converting all wheeled transport in the U.S. Army Europe (USAREUR) and U.S. Air Force Europe (USAFE) to German manufacture.)

3. Maintenance

U.S. units devote large numbers of soldiers—roughly 15 percent—to maintenance duties. However, Army maintenance operations are not efficient owing to high personnel turnover, haphazard facilities, distraction by tactical and administrative tasks, and an inadequate proportion of skilled mechanics.

The Army should consider the use, once again, of the Labor Service (LS) units (composed of German nationals) and Civilian Labor Group (CLG) units (composed of East European refugees) once common in USAREUR. Master craftsmen made up these units, which worked more efficiently than did U.S. Army units composed of less skilled personnel. The recent influx of ethnic Germans into the FRG makes renewed reliance on LS and CLG units feasible. Costs might well be comparable to those associated with the current system, owing to the large hidden expenses associated with U.S. military personnel. We propose shifting 11,000 maintenance billets in corps and army level units to the TA.

4. Military Police

One-third of the Military Police (MP) billets in combat support companies at corps level and above perform activities like road control and rear area security. These tasks are better performed by German units because they are more familiar with the local environment and better attuned to the sensitivities of the local population. The other two-thirds of MP billets should continue to be filled by U.S. troops, who can work more effectively with other U.S. troops, and who perform needed peacetime garrison functions. We propose eliminating 1,200 billets in MP combat support companies and shifting their responsibilities to integrated U.S./TA units.

5. Food Service

Food service personnel comprise 4 percent of USAREUR strength and 3 percent of field unit strength. These percentages exceed in-garrison requirements (because most soldiers do not eat at the mess) but have been required in the past to feed units in the field.

Owing to German reunification and the shift to a maneuver war strategy, most U.S. units will perform an operational reserve role, not an "on line" one. Such units will deploy in towns since even forests insufficiently mask unit signatures. Thus, they will be located along the road network and will have buildings available to serve as messes. For fast-breaking exercises, troops can use canned rations as they do now. In light of these changes, we believe that 2,500 billets can be removed from Germany, and that TA units can assume the responsibility for field feeding in large unit exercises and in war.

6. Signal

Signals organizations serving the Army's major European commands currently account for some 16,000 billets. In addition, field army units have their own communications sections. This pattern of organization and the number of troops associated with it have remained remarkably stable for decades.

Two considerations underscore the case for a reduction in signals personnel. First, the reunification of Germany and shifting NATO strategy imply that U.S. forces will become operational reserve focused on the eastern Lander. As such, the old signals organization, which operates on an area basis with the U.S. providing 3 corps and 2 communications zone (CZ) communications battalions, may no longer be appropriate. The Army can improve its operational flexibility despite diminished troop strengths by having the TA perform this mission, perhaps via use of the elaborate Bundespost system. Second, the revolutionary changes sweeping the telecommunications industry and the Army's clearly dated communications equipment suggests the possibility of major savings through fundamental restructuring of military communications. In light of these considerations and in anticipation of troop ceiling reductions in Europe, we propose that the Army shift 5 area signal battalions to the TA, for a savings of 3,000 billets.

B. TAKE ADVANTAGE OF CHANGED MILITARY CIRCUMSTANCES TO REMOVE AIR DEFENSE, NUCLEAR ARTILLERY, AND EUCOM HEADQUARTERS PERSONNEL

1. Air Defense

The Army's 32nd Air Defense command currently accounts for 12,000 billets in Germany. Troops in this organization man part of the Central Region HAWK and Patriot SAM "belt," with German, Dutch, and Belgian troops manning the rest.

In light of two recent developments, air defense has become a less critical mission for the U.S. Army in Europe. First, the impending relocation of Soviet air forces diminishes the payload they can carry and the threat that they pose. Second, concern over sovereignty makes likely the establishment of some form of air defense over the eastern Lander; German forces—not U.S. or other allied troops—would be appropriate for this role.

We propose that the TA take over the responsibility for manning the HAWK/ Patriot belt. It could organize for this mission on the model of the U.S. National Guard's gun and missile defenses for major American cities in the 1950s and the Air National Guard's current North American air defense assignment.

We further propose that the Germans take over the entire air defense mission. Doing so would increase the savings to the U.S. Army since it would permit elimination of indirect support and of a rotation base maintained almost exclusively in support of the European mission. This change would permit the Dutch and Belgians to gain a peace dividend, thus allowing other forces to be retained. Doing so would also imply that the Germans take the lead in Air Defense R&D, production and training. In light of this last role, it would make sense for German military units to be stationed at air defense ranges in Texas and New Mexico. This practice would provide a political dividend, by symbolically offsetting the presence of U.S. troops in Germany.

2. Nuclear Artillery

The Army currently devotes the following to nuclear missiles and artillery: 2,500 billets in Lance battalions; 5,500 billets in Pershing battalions mandated for removal but not yet gone; roughly 1,000 billets organic to artillery battalions to perform the dual-capable mission; and 6,000 billets in the 59th Ordnance group to store and secure

warheads. Many of these troops can be removed now. Given a political decision to move U.S. Army tactical nuclear weapons from Europe, the rest of these can be removed. (Another 1,000 billets could be eliminated in the Southern Flank countries.)

3. EUCOM Headquarters

Some 1,000 billets are associated with EUCOM headquarters. We propose eliminating this organization.

C. RESTRUCTURE ARTILLERY AND HELICOPTER ORGANIZATIONS

1. Artillery

In fast-breaking operations in which U.S. units perform as operational reserves, armor and artillery cannot both rush forward; most artillery must remain behind to avoid clogging roads. In maneuver warfare operations, tactical aircraft and multiple-launched rocket system (MLRS) units can provide fire support for fast-moving Army force.

The Army currently has 11 8-inch artillery battalions in Europe, with 6,400 troops. These 8-inch battalions can contribute little to the kind of fighting just described. We therefore propose removing them from Europe and adding three MLRS battalions (1,400 billets), for a net reduction of 5,000 soldiers in Europe. Once the constraints proposed for CFE 2 come into effect, the Army can reduce artillery even further.

2. Helicopters

The U.S. Army has 700 assault and attack helicopters in the Central Region, out of a total NATO inventory of 2,400. Both kinds of helicopters are highly valued in the new operational context, by all NATO armies. Unfortunately, this fact is not reflected in Western negotiators' proposed ceiling of 1,900 helicopters for all of the Alliance.

We propose that the U.S. remove 500 helicopters from Europe to permit the Alliance to meet the CFE 1 ceiling, and plan to remove an additional 200 for CFE 2. Retaining these helicopters in the Continental United States is preferable to losing them altogether; they can be given priority for return to Europe in the event of an emergency.

Removal of 500 helicopters implies stripping them from the four divisions and two large corps aviation brigades; it would leave them in the two Armored Cavalry Regiments (ACRs). It also would eliminate 5,500 billets from U.S. Army forces in

Europe. However, it would leave untouched the mundane tasks performed by helicopters like liaison, resupply, and evacuation.

APPENDIX E

COMPARATIVE RESERVE FORCES

COMPARATIVE RESERVE FORCES: TABLE I
(DRAFT)

Nations	United States	United Kingdom	Canada[1]	German Federal Republic	Netherlands
Characteristics					
TOTAL FORCE . (primary/secondary components)	Active/Reserve Mix	Active/Reserve Mix	Active/Reserve Mix	Active/Reserve Mix	Reserve/Active
Size (manpower)	Total: 3,818,300 Army: 1,849,700 Air Force: 847,600 Navy: 837,700 Marines: 283,500	Total: 630,400 Army: 401,400 Air Force: 127,150 Navy: 101,850 (includes Royal Marines)	Total: 143,600 Army: 42,300 Air Force: 25,500 Navy: 21,100 Additional: 54,700 (not identified by service)	Total: 1,347,300 Army: 1,057,700 Air Force: 212,000 Navy: 62,000 Interservice: 15,600 (above figures include regional home defense forces, not just 'field' forces)	Total: 242,000 Army: 206,700 Air Force: 24,200 Navy: 26,300 Other: 4,800
# Ground Units	~40 division equivalents (including Marines)	~9 division equivalents	1 division equivalent	~15 division equivalents (including 'Home Defense' brigades)	3 division equivalents
Additional Reserve Manpower (not organized into field units)	An additional 175,500 in retired reserve who could be mobilized for home training and other activities (87,300 Army; 28,800 Navy; 5,200 Marines; 54,200 Air Force); 56,450 active and reserve Coast Guard under Department of Transportation.	9,300 Ulster Defence Regiment/ Home Service Forces	6,600 in Coast Guard	20,000 in Federal border guards, 1,000 in Coast Guard	
Equipment Army (MBTs)	16,700 (including Marine MBTs)	1,290	114	5,005	913
Air Force[2] (fixed wing combat a/c)	5,836 (including 1,213 in storage)	742 (including 208 in storage)	133 (including 15 in storage)	608 (including 21 in storage)	207
Navy (Tonnage;[3] fixed wing combat a/c)	8,506,838; 2,673 (including 558 in storage)	897,343; 82 (including 7 in storage)	142,521; -	234,671; 95	115,470; -
Defense Budget (US$)	$289.8 billion (1989)	$34.6 billion (1989-90)	$9.3 billion (1989-90)	$28.6 billion (1989)	$ 6.6 (1989)

	United States	United Kingdom	Canada	Federal Republic of Germany	Netherlands
ACTIVE FORCES System	Volunteer	Volunteer	Volunteer	Universal conscription with career officers and NCOs	Universal conscription with career officers, some career NCOs, voluntary specialists (only about 40% of those eligible are conscripted, however)
Size (manpower)	Total: 2,124,900 Army: 766,500 Air Force: 579,200 Navy: 583,900 Marines: 195,300	Total: 311,600 Army: 155,500 Air Force: 91,450 Navy: 64,650 (includes Royal Marines)	Total: 89,000 Army: 23,500 Air Force: 24,200 Navy: 17,100 (24,200 non-distinguishable)	Total: 494,300 (includes 222,300 conscripts) Army: 494,300[4] (includes 175,900 conscripts) Air Force: 106,000 (includes 36,500 conscripts) Navy: 36,000 (includes 9,900 conscripts) Interservice: 11,600	Total: 103,600 (includes 49,600 conscripts) Army: 63,700 (includes 43,000 conscripts) Air Force: 18,200 (includes 4,800 conscripts) Navy: 16,900 (includes 1,400 conscripts) Other: 4,800 (includes 400 conscripts)
# Ground Units	~22 division equivalents including Marines	~5 division equivalents	under one division equivalent	~11.3 division equivalents	2 division equivalents[5]
% total force (manpower)	Total: 56% Army: 41% Air Force: 68% Navy: 70% Marines: 69%	Total: 49% Army: 39% Air Force: 72% Navy: 63% (includes Royal Marines)	Total: 42% Army: 56% Air Force: 95% Navy: 81% (of the non-distinguishable forces, 44% are active duty)	Total: 37% Army: 32% Air Force: 50% Navy: 58% Interservice: 74%	Total: 40% Army: 31% Air Force: 75% Navy: 64% others: 100%
RESERVE FORCES System	Combination of voluntary direct reserve enlistment and volunteer regulars finishing out total active/ reserve commitment	Voluntary; former active service individuals voluntarily enter Reserves: army, 173,100; naval and marine, 28,400, air force, 34,100. non-prior service enter Territorial Army or other service Auxiliaries	Voluntary; former active service members enter Supplementary Reserve (28,500). Others straight volunteer.	Involuntary. After active service, conscripts are entered into the reserves	Involuntary. Conscripts enter reserves as small units directly from active service
Size (manpower)	Total: 1,693,400 Army: 1,038,200 Air Force: 268,200 Navy: 257,800 Marines: 88,200	Total: 318,800 Army: 245,900 Air Force: 35,700 Navy: 37,200 (includes Royal Marines)	Total: 56,600 Army: 18,800 Air Force: 1,300 Navy: 4,000 (non-distinguishable, 30,500)	Total: 853,000 Army: 717,000 Air Force: 106,000 Navy: 26,000 Interservice: 4,000	Total: 158,400 Army: 143,000 Air Force: 6,000 Navy: 9,400
# Ground Units	~18 division equivalents (including Marines)	~4 division equivalents	fills out single division	almost 3 division equivalents	1 division equivalent
Reserve Roles	Firstline combat, support units (both National Guard); non- divisional units, fleshing out other firstline units (Army Reserve), firstline air units (Air National Guard), fleshing out naval combatants and aviation; augmenting active units; various individual posts	(ground) firstline combat & support units, augmenting combat and support units; (air) air base and air defense; (naval) mine warfare vessels, shipping control, staff augmentation	flesh out and augment firstline units; provide various support and rear services; air reserve fields some non-combat flying units	fill out some active units, form 12 'Territorial Brigades' (at from 20-60% active duty composition) and form home defense units, form support units for FRG and American troops; augment air defenses, coastal defenses, staffs	firstline reserves (RIN units -- Rechtstreeks Instromend Mobilisabel) fill out superior active cadres units both combat and support (RIN commanders and key specialists are active duty); second line reservists act as augmentation to other reserve and active units

	United States	United Kingdom	Canada	Federal Republic of Germany	Netherlands
% total force (manpower)	Total: 44% Army: 59% Air Force: 32% Navy: 30% Marines: 31%	Total: 51% Army: 61% Air Force: 28% Navy: 37% (includes Royal Marines)	Total: 38% Army: 44% Air Force: 5% Navy: 15% (non-distinguishable, 44%)	Total: 45% Army: 68% Air Force: 50% Navy: 42% Interservice: 26%	Total: 60% Army: 69% Air Force: 25% Navy: 36%
Reserve Budget Source	Defense Budget; State budgets (partial funding for National Guard Units)	Defense Budget	Defense Budget	Defense Budget	Defense Budget
Mobilization System	various depending upon reservist type: report to local Reserve/ National Guard centers; report to specified duty posts; await orders	various: Territorials report to unit centers; Reservists to assignments or await orders	report to local regiment/ battalion/task centers	report to unit mobilization centers or personal assignments	RIN reservists (firstline) report to mobilization centers; second line reservist to individual assignments
Reserve Equipment	firstline for some units, second line for many	firstline equipment	some firstline	firstline for some units, second line for others	firstline for some units, second line for others, other units short of equipment
Mobilization Time	Selected units to be ready to go overseas in 24 hours; some reserve/ National Guard units not ready for as long as 90 days; most fall in between	varies from a few days to several weeks	estimated two weeks for companies slated for integration into active battalions, longer if intending to activate reserve battalions	estimated at 3 days	several days for RIN units
Reserve Service (Periods & Frequency)	National Guard units: 48 half day drills plus two week period annually; others vary depending upon assignments from regular drills for Select Ready Reserves to no drill at all for most Individual Ready Reserves and all Standby Reserves	Territorials train for 22 days and two weeks annually; Reserves have no training obligation	15 days per year for Militia, none required for Supplementary reserves	three two week periods over five years for unit reservists	RIN units (first 20 months after active service) see no training; thereafter up to 60 days in 3 years, more for specialists
Length of Reserve Obligation	Only active enlistees obligated to serve for a combination of active/reserve service for a total of six years; volunteer reservists obligated for reserve enlistment terms	ex-active service obligated to have served for 7 or twelve years combined active and reserve service (depending upon enlistment); Territorials obligated for reserve enlistment terms	Militia serve three year enlistments	After first year after active service, conscripts enter 5 year "Alert Reserve" for (mostly) unit service; after that he enters replacement reserve pool (population not recorded here) to age 45 for enlisted and 60 for officers and NCOs	to age 35 for enlisted, 45 for officers
Reserve Careers/ Benefits	yes, especially for officers; retirement benefits after 20 years of service (combined active/reserve)	not really	none	none	none
Initial Reserve Training	in active service for former regulars in reserves, otherwise individuals must attend basic and individual training schools before being ready to serve	in active service for former regulars in reserves, Territorials must attend basic and individual training schools before being ready to serve	active service for Supplementary reserves; Militia receive basic and individual training	in active service for all reservists	in active service for all reservists

Demographics					
# of 18 year old men in 1989	1,971,000	452,000	202,000	399,000	122,000
# of 18 year old men in 2000	1,870,000	369,000	187,000	315,000	91,000
% change	-5%	-18%	-7%	-21%	-26%
	United States	United Kingdom	Canada	Federal Republic of Germany	Netherlands
REMARKS	Organized for deployment overseas (short European war, out of area response) and as the basis for a larger mobilization force that would require a draft; Reserve system produces units of varying quality, ranging from equality with the best active units to relatively low quality, but generally better than those of other NATO nations; only a few Reforger units have trained in likely battle areas; force structure undergoing shrinkage at this time	Organized for overseas deployment and short war scenarios; some training on possible battlegrounds; high turnover in Territorials and lack of obligatory drills for Reserves makes for uncertain wartime performance; system undergoing drastic changes.	Total force organized around functions rather than service; reserve system is really a basis for further, longterm mobilization; Militia units are seriously understrength and under-equipped and perform almost no training above company level.	Organized to defend home territory in short war scenario; trains on possible battlefields; only 'Territorial' units slated for non-home defense tasks; one of the most carefully organized reserve forces in NATO. Undergoing drastic structural changes due to planned merger with East Germany. Alert Reserves call up requires Parliamentary approval.	Organized to service with Dutch Corps in NATO and home defense; train on possible battlefields; short war preparation; joint active/RIN individual unit service combined with high manpower turbulence and shortage of equipment for reserve units suggest varying levels of effectiveness. Parliamentary approval required to call out RIN units.

COMPARATIVE RESERVE FORCES: Table I(continued)

(DRAFT)

Nations	France	Sweden	Finland	Soviet Union	Switzerland	Israel
Characteristics						
TOTAL FORCE (primary/secondary components)	Active/Reserve Mix	Reserve/cadre	Reserve/cadre	Active/Reserve Mix	Reserve/cadre	Reserve/Active
Size (manpower)	Total: 819,000 (includes firstline reserves and active forces only) Army: 559,500 Air Force: 132,100 Navy: 93,500	Total: 479,000 (includes active forces, all naval and air force reserves and only field army reserves) Army: 300,000 Air Force: 65,000 Navy: 114,000	Total: ~300,000 (includes active forces, all air and naval reserves, and general force ground reserves) Army: ~258,000 Air Force: ~30,000 Navy: ~12,000	Total: ~9,934,000 (includes active forces, KGB, MVD, and Rail & Const. Troops and reserves having completed service in last five years)[6] Army: 4,596,000 Air Force: 1,225,000 Navy: 977,000 Strategic Rocket Forces: 824,000 Air Defense: 1,232,000 KGB: 230,000 MVD: 340,000 Rail & Const. Troops:[7] 490,000	Total: 625,000 (includes all levels of reserves as well as active troops, Army and Air Corps)	Total: 600,000 Army: 495,000 Air Force: 85,000 Navy: 20,000
# Ground Units	~17 division equivalents	~18 division equivalents	~12 division equivalents	~220 division equivalents (Category A/B/C and special units)[8]	12 divisions plus non-divisional units	18 division equivalents
Additional Reserve Manpower (not organized into field units)	1,190,000 more beyond firstline reserves theoretically available for service in territorial districts and elsewhere as ordered	300,000 more reservists in local defense units (90 bns, 400-500 coy.) and a further 125,000 in home guard forces	~200,000 additional reservists for local defense forces and ~200,000 more reservists unassigned available as replacements	An additional 55,000,000 are still under reserve obligation, but are most unlikely to be called to the colors	No additional forces	13,500 Nahal (military/agricultural) and border police available for service; unknown number of home guard troops in small groups
Equipment Army (MBTs)	1,340	885	180	53,580	820	3810
Air Force[9] (fixed wing combat a/c)	641	465	121	7,325	286	635 (includes 70 in storage)
Navy (Tonnage;[10] fixed wing combat a/c)	453,504; 90	46,000;-	8,639;-	4,219,164; 564	none	19,156;-
Defense Budget (US$)	$28.83 billion (1989)	$4.78 billion (1988-89)	$1.81 billion (1989)	$119.25 billion est. (1989)	$1.597 billion (1989)	$5.1 billion (1988)

	France	Sweden	Finland	Soviet Union	Switzerland	Israel
ACTIVE FORCES (System)	Universal conscription with career officers and specialists	Universal conscription with career specialists/trainers	Universal conscription with career specialists/trainers	Universal conscription with career officers	Career training forces and senior officers process batches of conscripts twice yearly	Universal conscription[1] with career officers and specialists/trainers
Size (manpower)	Total: 466,300 (240,100 conscripts) Army: 292,500 (183,000 conscripts) Air Force: 94,100 (35,900 conscripts) Navy: 65,500 (19,200 conscripts)	Total: 64,5 00 (49,000 conscripts) Army: 44,500 (37,700 conscripts) Air Force: 8,000 (5,000 conscripts) Navy: 12,000 (6,300 conscripts)	Total: 31,000 (23,700 conscripts) Army: 27,000 (22,300 conscripts) Air Force: 1,900 (600 conscripts) Navy: 1,400 (600 conscripts)	Total: 4,258,00 (2,700,000 conscripts) Army: 1,396,000 (1,200,000 conscripts) Air Force: 488,000 (310,000 conscripts) Navy: 437,000 (260,000 conscripts) Strategic Rocket Forces: 287,000 (315,000 conscripts) Air Defense: 502,000 (300,000 conscripts) KGB: 230,000 (167,000 conscripts) MVD: 340,000 (mostly conscripts) Rail & Const. Troops: 490,000 (almost all conscripts)	N/A; 3,500 regulars provide training base to 17,000 conscripts at a time for two 17 week periods annually	Total: 170,900 (including male and female conscripts) Army: 130,000 (including conscripts) Air Force: 30,000 (including conscripts) Navy: 10,000 (including conscripts)
# Ground Units	~15 division equivalents	N/A; active units are essentially training formations	N/A; active units are essentially training formations	~61 division equivalents in Category A; ~53 Category B divisions; ~106 Category C divisions	N/A; all divisions are reserve with only key posts held by regulars and reservists serving duty	7 active division equivalents needing fleshing out by reservists; at any time 5-10% of reservists are under arms
% total force (manpower)	37% Army: 52% Air Force: 42% Navy: 70%	13.5% Army: 19% Air Force: 12% Navy: 10.5%	10% Army: 11% Air Force: 6% Navy: 12%	42.8% Army: 34.7% Air Force: 39.8% Navy: 44.7% Strategic Rocket Forces: 34.8% Air Defense: 40.1% KGB: 100% MVD: 100% Rail & Const. Troops: 100%	Under 1% of total force structure are regulars	28.5% Army: 26.2% Air Force: 35.3% Navy: 50%

RESERVE FORCES System	After conscript service all personnel pass into firstline reserves for four years, then into home guard and regional units	After mandatory national service, all conscripts enter reserves. Army conscripts pass into Field Army reserve until age 32, then into regional and home guard units not examined here; Naval conscripts enter coastal defense units	After mandatory universal service, all conscripts pass into reserves.	After mandatory universal service, all conscripts enter reserves; ex-conscripts of the ground forces enter reserve units near home	After mandatory service all conscripts enter reserves	France After active service, each reservist is assigned to a specific firstline reserve unit until age 39, then to a specific second line unit until age 55; women serve only until age 34 or marriage, whichever comes first
Size (manpower)	Total: 353,000 (firstline only) Army: 267,000 Air Force: 58,000 Navy: 28,000	Total: 414,500 (all air and naval reserves, ground Field Army only) Army: 255,500 Air Force: 57,000 Navy: 102,000	Total: 265,800 (includes all air and naval reserves, plus general force ground units) Army: ~230,200 Air Force: ~28,200 Navy: ~10,600	Total: 5,676,000 (reserves who have completed active duty within last five years) Army: 3,000,000 Air Force: 775,000 Navy: 540,000 Strategic Rocket Forces: 537,000 Air Defense: 750,000 (No known KGB/MVD/Rail & Const. Troop reserves)	Total: 621,500 (Army and Air Corps)	Total: 430,000 Army: 365,000 Air Force: 55,000 Navy: 10,000
# Ground Units	2 light armored divisions (based on training schools) plus support units and non-divisional units in higher formations	Upon mobilization, Field Army of 29 brigades and 110 independent battalions formed from reserves and key active personnel	~30 brigades formed upon mobilization for general forces (non-region specific employment)	Reserves would flesh out Category A (54) & B (53) divisions and would proceed to C divisions (106) for retraining	Reserves would make up virtual entirety of 12 division plus non-divisional units	11 divisions and non-divisional units
Reserve Roles	firstline combat units and support units	all firstline ground combat and support units; coastal defense units, fleshing out certain naval formations	all firstline ground combat units, flesh out some naval crews, coastal artillery, air defense units	Ground force reserves sent to flesh out preselected units serving in combat and non-combat roles; role of reserves in other services unclear	All units	Reserve units provide majority of firstline ground units and all second line units (may also man a reserve air wing); also air defense, coastal defense forces
% total force (manpower)	Total: 43% Army: 48% Air Force: 38% Navy: 30%	Total: 86.5% Army: 85% Air Force: 88% Navy: 89.5%	Total: 90% Army: 89% Air Force: 94% Navy: 86%	Total: 57.2% Army: 45.3% Air Force: 60.2% Navy: 55.3% Strategic Rocket Forces 65.2% Air Defense: 59.9%	Total: in excess of 99%	Total: 71.7% Army: 73.8% Air Force: 64.7% Navy: 50%
Reserve Budget Source	Defense Budget	Defense Budget	Defense Budget	Defense Budget	Defense Budget	National Insurance, Treasury, and Defense Budget
Mobilization System	First year reservists to report to prior active service units; other firstline reservists to specified units	Report to regional/unit centers	Report to regional/unit centers	Report to local divisional centers	Report to local unit assembly centers	report to local brigade/divisional mobilization centers

	France	Sweden	Finland	Soviet Union	Switzerland	Israel
Reserve Equipment	Firstline Equipment for combat units	Frontline equipment for all mobilized Field Army units	Frontline equipment for all mobilized general forces	Frontline equipment for Category A divisions, second line equipment for Category B and C divisions	Frontline equipment to firstline reserves, older equipment for second and third line units	Frontline equipment for firstline units (active and reserve), second line equipment for second line units; some reserve pilots on second line a/c
Mobilization Time	Perhaps a week	Under a week	4-5 days to total mobilization	'A' divisions are considered immediately ready; 'B' divisions 3-7 days to readiness; 'C' divisions to be ready in less than 60 days	Supposedly 24 hours	Several days to full mobilization
Reserve Service (Periods & Frequency)	no fixed period or frequency, but only during first five years after active service	17 days/year for Field Army reservists; 60,000-120,000 train each year	40 days total until end of obligation; ~50,000 reservists train each year	'B' and 'C' subdivisional units normally hold two exercises per year, and supposedly train as a division about once every three years	21 days/8 years for firstline (21-32 years of age); 39 days/3 years for second line (33-42 years old); 13 days/2 years for home guard (43-50 years old)	35+ days/year for firstline enlisted (to age 39), 42+ days/year for firstline officer; less for second line units
Length of Reserve Obligation	to age 45 (enlisted) to age 60 (officers)	until age 32 for Field Army service, until 47 for local defense units	until age 50 for enlisted and 60 for officers and NCOs (including service in local defense units)	until age 50 for enlisted and junior officers; 55 for company grade officers; 60 for field grade officers; 65 for senior officers	until age 50	until age 55 for men; to age 34 or marriage, whichever comes first for women
Reserve Careers/ Benefits	none	none	none	none	none	none
Initial Reserve Training	100% in active forces for both enlisted and officers	during active service for 100% of enlisted and officers	during active service for 100% of officers and enlisted	during active service for 100% of officers and enlisted	during active service for 100% of officers and enlisted	during active service for all officers and most enlisted soldiers; for older immigrants special reserve training is provided
Demographics						
# of 18 year old men in 1989	452,000	58,000	34,000	2,092,000	48,000	66,000[12]
# of 18 year old men in 2000	401,000	55,000	34,000	2,474,000	41,000	71,000
% change	-9%	-5%	0%	+18%	-15%	+8%

[redacted]	Reserves described as under-equipped and undertrained; organized both for a short war in Central Europe and for territorial defense; some training in possible combat zones	Forces organized to defend key sectors of home territory; frequently train in expected battle areas; firstline reserve forces considered quite good, if under-equipped.	Forces organized to defend key sectors of home territory; frequently train in possible battle zones; forces considered quite good	All figures based on guesstimates; workings of reserve system little known; "Mobilization" divisions not included in calculations; massive reorganizations underway; reliability of many troops unclear; quality of reservists probably low; organized for in-country and out of country assignment.	Forces organized to defend virtual entirety of home territory, with emphasis on key locales; units train in expected deployment areas; forces considered first-rate.	Forces organized to maintain peacetime deterrent/border protection and to cover mobilization. Most reservists have combat experience; most reserve units undergo operational employment at least once a year. Organized only for short war effort. Demographic profile undergoing rapid change due to immigration.

Chief Sources: IISS The Military Balance, 1989-1990; David C. Isby & Charles Kamps, Jr., Armies of NATO's Central Front; Bernard Prézelin, editor, The Naval Institute Guide to the Combat Fleets of the World 1990/199 Irving Heyman, "Analysis of the Army Reserve systems of Israel, Canada, United Kingdom, Federal Republic of Germany, and the Netherlands;" Ministry of Defence (Sweden), The Swedish Defence 1988-1989: Facts and Figure North Atlantic Assembly International Secretariat, Manpower Issues for NATO: Recruitment, Retention, Reserves; Shlomo Gazit & Zeev Eytan, The Middle East Military Balance 1988-1989; John McPhee, La Place de la Conscr Suisse; Reuven Gal, A Portrait of the Israeli Soldier, Central Bureau of Statistics (Israel), Statistical Abstract of Israel 1989.

Notes:

1. Canada has a unified service system, organized by functions. As a result it is impossible to divide personnel accurately in a fashion comparable to the other nations in this matrix.

2. Includes Air Defense aircraft; numbers include fighters, bombers, ground attack, reconnaissance, and light attack aircraft.

3. Figures employ submerged weight for subs, fully loaded weight for surface warships, when data is available. Ships types included here are regular combatants, mine warfare vessels, amphibious warfare vessels, ASW vessels, and support ships. Figures do not include experimental vessels, research vessels, fisheries patrol ships, harbor craft, maritime police/coast guard/border control craft, tugs, chartered vessels, training ships, and service craft.

4. This figure includes "Ready Reserve" of 30,000 who completed their active service in the preceding year. They train for 10-14 days in that year and would return to their previous units to round out skeleton companies.

5. Active ground units receive new batches of conscripts just completing individual training every two months, so active unit readiness is really rather low.

6. It is unclear what roles Soviet non-ground force reservists would be called upon to perform if mobilized.

7. Recent Soviet comments suggest these forces may not actually receive military training.

8. Category A divisions are at 75%-100% personnel strength and have complete equipment sets and are considered combat ready; Category B Divisions are at 50-75% personnel strength and have complete equipment sets; Category C divisions are at 20-50% personnel strength and might have complete sets of equipment, but definitely of older models. The various special units are usually at full strength.

9. Includes Air Defense aircraft; numbers include fighters, bombers, ground attack, reconnaissance, and light attack aircraft.

10. Figures employ submerged weight for subs, fully loaded weight for surface warships, when data is available. Ships types included here are regular combatants, mine warfare vessels, amphibious warfare vessels, ASW vessels, and support ships. Figures do not include experimental vessels, research vessels, fisheries patrol ships, harbor craft, maritime police/coast guard/border control craft, tugs, chartered vessels, training ships, and service craft.

11. Universal conscription only applies to Jews (male and female) and Druze; Arabs may volunteer; eligible men and women may be excused service on religious grounds, women also if married.

12. Demographic figures for Israel include Jews (male & female) and Druze (males), but no other portions of population.

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